SLV-X20DK
RMT-V262C

SERVICE MANUAL

ME Model

Remote commander RMT-V262C is available as a unit, but as individual parts the battery case lid of commander is only available.

SPECIFICATIONS

System

Format	VHS standard
Video recording system	Rotary 2-head helical scanning system
Audio recording system	Monaural
Video signal	PAL/SECAM color
Tape speed	23.39 mm/sec.
Maximum recording time	240 minutes with E-240 cassette
Fast-forward and rewind time	Approx. 4 min. 15 sec. (T-120)
Audio frequency response	80Hz - 10kHz
Distortion	Less than 4%
Wow and flutter	Less than 0.35%

Tuner section

Tuner system	39-position voltage system tuner
Channel coverage	PAL B/G, SECAM B/G VHF channels 2 - 12 UHF channels 21 - 69 SECAM D/K VHF channels R1 - R12 UHF channels 21 - 69 PAL D/K VHF channels C1 - C12 UHF channels C13 - C56
Antenna	75-ohm antenna terminal for VHF/UHF
RF converter output	UHF channels 30 to 39

Inputs and outputs

LINE IN (front and rear)	VIDEO IN (phono jack) (2) input signal: 0.5-2.0 Vp-p, 75 ohms ± 5 ohms AUDIO IN (phono jack) (2) input level: –8 dBs input impedance: more than 50 kilohms
LINE OUT	VIDEO OUT (phono jack) (1) output signal: 1.0 ± 0.2 Vp-p, 75 ohms ± 5 ohms AUDIO OUT (phono jack) (1) output level: –8 dBs output impedance: less than 10 kilohms

Timer section

Clock	Quartz locked
Timer indication	24-hour indication
Timer setting	6 programs for 1 year max.
Power back-up	Back-up duration: approx. 1 hour
Tape counter	Linear time counter

General

Power requirements	220 V AC, 50 Hz
Power consumption	30 W
Dimensions	Approx. 430 × 90 × 323 mm (w/h/d) ($17 \times 3^{5}/_{8} \times 12^{3}/_{4}$ inches)
Weight	Approx. 5.9 kg (13 lb.)

MICROFILM

VHS VIDEO CASSETTE RECORDER

SONY®

Remote Commander

Remote control system	Infrared control
Power requirements	3V DC, two R6 batteries
Dimensions	Approx. 51 × 18 × 175 mm (w/h/d) ($2^1/_8 \times ^{23}/_{32} \times 7$ inches)
Weight	Approx. 75 g (3 oz.) (not including batteries)

Accessories supplied

Remote Commander with two R6 batteries (1)
75-ohm coaxial cable with DIN type connector (1)
Schematic diagram (1)

Note
This appliance conforms with EEC Directive 87/308/EEC regarding interference suppression.

Design and specifications are subject to change without notice.

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

Caution
Television programs, films, video tapes and other materials may be copy righted.
Unauthorized recording of such material may be contrary to the provisions of the copyright laws.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splashes and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the B+ voltage to see it is at the values specified.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

TABLE OF CONTENTS

Section	Title	Page
SECTION 1. GENERAL		
	Precautions	5
	Location and Function of Parts and Controls	5
	Connections	7
	Date and Clock Setting	7
	Adjusting the TV	8
	Presetting the Active Channels in Your Area	8
	Handling Video Cassettes	10
	Playback	10
	Various Playback Modes	11
	Recording TV Programs	12
	Timer-Activated Recording	13
	Quick Start Recording	15
	Blank Search Function	16
	Tape Editing	16
	Troubleshooting	17
SECTION 2. DISASSEMBLY		
	2-1. Removal of Upper Case	19
	2-2. Removal of Bottom Plate	19
	2-3. Removal of Front Cabinet	19
SECTION 3. DIAGRAMS		
	Circuit Board Locations	20
	Overall Wiring Diagram	21
	Mechanism Connection Circuit	23
	Video Circuit Basic Block Diagram	24
	System Control & Servo Circuit Basic Block Diagram	27
	Audio Circuit Basic Block Diagram	30
SECTION 4. SCHEMATIC DIAGRAM AND PRINTED WIRING BOARDS		
	CP-1 Board (PW-A) Power Supply Circuit Diagram	31
	PW-1,2 Board Power Supply Circuit Diagram	34
	CP-1 Board (VD-A) Video Circuit Diagram	36
	VD-1 Board PAL/SECAM Discrimination Circuit Diagram	38
	TB-1 Board Video (AV)/AUDIO Input Selection Circuit Diagram	40
	VP-1 Board Video Pre-amp Circuit Diagram	40
	CP-1 Board (CV-A) RF Converter Connection Circuit Diagram	40
	CP-1 Board (SY-A) System Control Circuit Diagram	42
	CP-1 Board (SV-A) Servo Circuit Diagram	45
	TM-1 Board Display,Timer & Tuning Control/ TM-2 Board Switch & VR Circuit Diagram	48
	CP-1 Board (TN-A) Tuner IF Connection Circuit Diagram	51
	TN-7 Board TUNING Det. & SYNC Det. Circuit Diagram	52
	IF Circuit Diagram	54
	RF Converter Circuit Diagram	56
	CP-1 Board (AD-A) Audio Circuit Diagram	58
	IC301 (LC66308A) System Control MPU Pin Functions Table	60
	IC351 (LC7416) Digital Servo IC Pin Functions Table	61
	IC711 (M50958) Timer MPU Pin Fuctions Table	62
SECTION 5. MECHANISM SERVICE TECHNICAL INFORMATION		
	1. Outline of Mechanism	63
	1-1. Full Loading Mechanism	63
	2. Description of Mechanism Operation	
	2-1. Basic Operation Mode of Mechanism	65
	2-2. Description of Mechanism Drive	66
	2-2-1. Tape Loading Mechanism	70
	2-2-2. Pinch Roller Pressing Mechanism	71
	2-2-3. Operation of Brake Control Plate	72
	2-2-4. Brake Control Mechanism	73
	2-2-5. Brake Lock Release Mechanism	74
	2-3. Reel Table Drive	
	2-3-1. Reel Table Drive Mechanism	76
	2-3-2. Reel Table Drive Clutch Lock and Release Mechanism	78
	2-4. Front Loading Drive Selection Mechanism	80
	2-5. Cassette Holder Mechanism	
	2-5-1. Components	84
	2-5-2. Description of Cassette Holder	85
	3. Mechanism Control	
	3-1. Mode Arrangement	86
	3-2. Mode Detection Switch	86
	3-3. Consideration to Full Loading	87
	4. Mechanism Maintenance and Checking	
	4-1. Periodic Checking and Maintenance Items and Service Jigs	88
	4-1-1. Periodic Check Items	88
	4-1-2. Cleaning	89
	4-1-3. Service Jigs	90
	4-2. Mode Selector (VHJ-0050) Handling Instructions	91
	4-2-1. Part Names	91
	4-2-2. Connection Method	92

Section	Title	Page
	4-2-3. Handring Method	93
5.	Mechanism Dismantling and Reassembling	
	5-1. Mechanism Main Unit	94
	5-2. Cassette Holder Mechanism	
	5-2-1. COMPL Cassette Mechanism	95
	5-2-2. Gear Bracket Ass'y	96
	5-2-3. Cassette Drive Gear (Right)	97
	5-2-4. Cassette Drive Gear (Left)	98
	5-2-5. FL Start Switch	99
	5-2-6. T-Top Sensor, T-End Sensor	100
	5-3. COMPL Holder Motor	
	5-3-1. COMPL Motor Bracket	101
	5-3-2. Loading Motor	102
	5-4. Tape Loading Mechanism	
	5-4-1. Main Parts of the Tape Loading Mechanism	104
	5-4-2. Mode Cam	106
	5-5. COMPL Head Bracket (ACE Head)	107
	5-6. Pinch Roller Pressure Mechanism	108
	5-7. Brake Mechanism	
	5-7-1. Sub Take-up Brake Ass'y	110
	5-7-2. Supply Brake Ass'y and Take-up Brake Ass'y	111
	5-7-3. Tension Lever Ass'y and Band Holder Ass'y	112
	5-7-4. Capstan Brake Ass'y	113
	5-8. Reel Table Drive Mechanism	
	5-8-1. Supply Reel Ass'y and Supply Reel Gear	114
	5-8-2. Take-up Reel Ass'y	115
	5-8-3. Take-up Reel Gear	116
	5-8-4. Reel Pulley and Friction Gear Ass'y	117
	5-8-5. COMPL Clutch	118
	5-8-6. Clutch Change Lever and Clutch Lever Ass'y	119
	5-9. Capstan Motor	120
	5-10. Fixed Guide, FE Head Lever Ass'y	
	5-10-1. Entrance side Fixed Guide and FE Lever Ass'y	121
	5-10-2. Impedance Roller, FTE Head	122
	5-10-3. Exit side Fixed Guide	123
	5-11. Drum Section	
	5-11-1. Drum Motor (rotor, stator)	124
	5-11-2. Drum Unit	125
	5-11-3. Upper Drum	126
	5-12. How to Proceed when the Cassette cannot be Removed	129
6.	Mechanism Adjustment	
	6-1. Operating the Mechanism with no Cassette Inserted	130
	6-2. Reel Table Height Adjustment and Torque Check	
	6-2-1. Reel Table Height	131
	6-2-2. Torque Check	132
	6-3. Tension Pole (Back Tension Guide) Position Adjustment and Back Tension Torque Check	
	6-3-1. Tension Pole (Back Tension Guide) Position Adjustment	133
	6-3-2. Back Tension Torque Chack	133
	6-4. Tape Path Adjustment	134
	6-4-1. Preparations for Adjustment	134
	6-4-2. Adjustment by Visual Observation after Guide Roller, Fixed Guide or COMPL Head Bracket Replacement	135
	6-4-3. Entrance Side Fixed Guide (S) Height Adjustment	136
	6-4-4. Guide Roller Adjustment	137
	6-4-5. Exit Side Fixed (T) Adjustment	138
	6-4-6. COMPL Head Bracket (ACE Head) Adjustment	138
	6-4-7. Checking after Adjustment	140
SECTION 6.	ELECTRICAL ADJUSTMENTS	
1.	Circuit Board Locations	
	1-1. Main Boards	142
	1-2. Location for Tape Path Adjustment	142
2.	Electrical Adjustment	
	2-1. Preparation	
	2-1-1. Equipment	143
	2-1-2. Set-up	143
	2-2. Servo Circuit Adjustment (CP-1 PCB)	144
	2-3. Video Circuit Adjustment (CP-1 PCB and VP-1 Assy)	146
	2-4. Audio Circuit Adjustment (CP-1 PCB)	148
SECTION 7.	EXPLODED VIEWS	
	7-1. Cabinet & Chassis Parts	149
	7-2. Mechanism Parts 1	150
	7-3. Mechanism Parts 2	151
	7-4. Mechanism Parts 3	152
SECTION 8.	ELECTRICAL PARTS LIST	153
	HARDWARE LIST	159

Precautions

On safety

- Operate the unit only on 220 V AC, 50 Hz.
- Should any solid object or liquid fall into the cabinet, unplug the unit and have it checked by qualified personnel before operating it any further.
- Unplug the unit from the wall outlet if it will not be used for an extended period of time. To disconnect the cord, pull it out by the plug. Never pull the cord itself.
- The unit is not disconnected from the AC power source as long as it is connected to the AC power outlet, even if the unit itself has been turned off.
- The nameplate indicating operating voltage, power consumption, etc. is located on the rear of the unit.
- AC power cord must be changed only at the qualified service shop.

On installation

- Allow adequate air circulation to prevent internal heat build-up.
- Do not place the unit on surfaces (rugs, blankets, etc.) or near materials (curtains, draperies) that may block the ventilation slots.
- Do not install the unit near heat sources such as radiators or air ducts or in a place subject to direct sunlight, excessive dust, mechanical vibration or shock.
- The unit is designed for operation in a horizontal position. Do not install it in an inclined position.
- Keep the unit and cassette tapes away from equipment with strong magnets, as for example a microwave oven or a large loudspeaker.
- Do not place any heavy object on the unit.

On operation

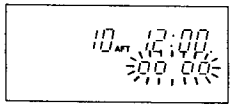
- When the unit is not in use, turn the power off to conserve energy and to extend its useful life.
- Remove and store video cassettes after recording or playback.
- Store the cassettes in their cases and keep them in an upright position to prevent intrusion of dust and uneven winding.

On moisture condensation

If the unit is brought directly from a cold to a warm location, moisture may condense on the video head drum. In this condition, the tape may adhere to the head drum and cause serious damage to the head. To avoid damage caused by moisture condensation, be sure not to leave a cassette inside the compartment when the unit will not be used. When the unit is first installed, or when it is moved from a cold to a warm location, wait for about 30 minutes before operating it so that its temperature becomes identical to the room temperature.

If moisture condensation is present

The dew mark (0000) appears in the display window and the unit will not operate.



Leave the unit until its temperature reaches the room temperature and the indicator will disappear.

On cleaning

Clean the cabinet, panel and controls with a dry soft cloth, or a cloth slightly moistened with a mild detergent solution. Do not use any type of solvent, such as alcohol or benzine, which might damage the finish.

On repacking

Do not throw away the carton and packing materials. They make an ideal container in which to transport the unit. When shipping the unit to another location, repack it as illustrated on the carton.
If you have any question about this unit, contact your Sony service facility.

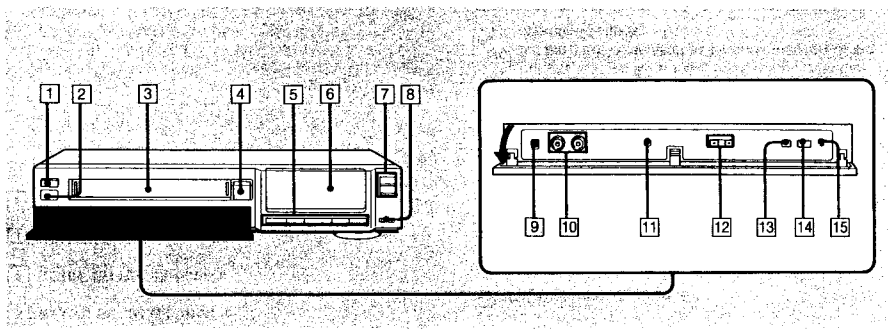
On color system

This unit is designed to receive, record and play back programs based on the PAL (B/G and D/K), and SECAM (B/G and OIRT) color systems.

- Tapes recorded with the French SECAM color system can be played back on this unit but the picture displayed will be black and white. It is not possible to receive French TV broadcasts with this unit.

Location and Function of Parts and Controls

Front Panel



1 **⏻ (power) ON switch and indicator**

2 **Remote sensor**

3 **Cassette compartment**

4 **⏏ EJECT button**

5 **Tape transport buttons**
■ STOP, ◄◄ REW (rewind), **► PLAY, ►► FF** (fast-forward), **II PAUSE**

6 **Display window**

7 **PROGRAM +/– button**

8 **● REC (record) button**

9 **SELECT switch**
FRONT: Receives the input signals from the equipment connected to the LINE IN jacks inside the front panel.
REAR: Receives the input signals from the equipment connected to the LINE IN jacks on the rear.

10 **LINE IN VIDEO/AUDIO jacks (phono type)**

11 **SHARPNESS control**
Use to adjust the sharpness of the picture if necessary. Normally set the control at the center detent position.

12 **TRACKING/FINE TUNING ▼/▲ button**

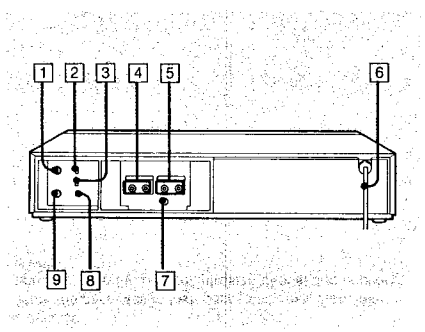
13 **TUNER PRESET button**

14 **NEXT button**

15 **ALL CLEAR button**
When the malfunction occurs, press this with the pencil or similar object.
When this button is pressed, all memorized data (for time, date, timer setting and tuner presetting) will be cleared and "88:88" will blink in the display window.

This section is extracted from instruction manual.

Rear Panel



1 **AERIAL IN connector**
Connect the aerial cable.

2 **TEST SIG. (signal) ON/OFF switch**
Set to ON to obtain the test pattern for adjusting the TV so that it can receive the signal from the recorder.

3 **TV SYSTEM selector**
Set to the position that conforms to the TV system of your area.

4 **LINE IN VIDEO/AUDIO jacks (phono type)**

5 **LINE OUT VIDEO/AUDIO jacks (phono type)**

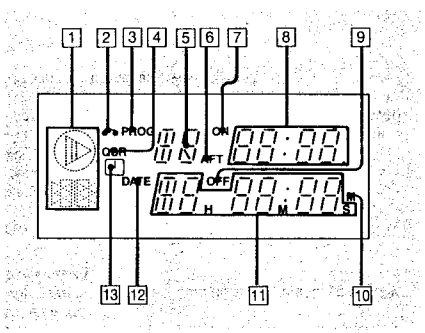
6 **AC power cord**

7 **V-LOCK (vertical lock) control**
Turn this screw if playback pause picture moves up and down.

8 **RF CHANNEL selelctor**
If there is interference on the factory preset channel for RF output and the signal of the VTR cannot be displayed clearly on the TV screen, adjust this selector.

9 **AERIAL OUT connector**
Connect to the aerial input of the TV receiver using the supplied cable.

Display window



1 **Mode display**

2 **Cassette indicator**

3 **PROG (program) indicator**
Appears when setting the timer for the timer-activated recording.

4 **QSR (quick start recording) indicator**
Appears while the VTR is performing quick start recording.

5 **Program number**

6 **AFT (automatic fine tuning) indicator**

7 **ON (on-time) indicator**

8 **Current time/tracking position indicator**
Indicates the current time. Also indicates the timer-activated recording start time.
When adjusting tracking, indicates the tracking position.

9 **OFF (off-time) indicator**

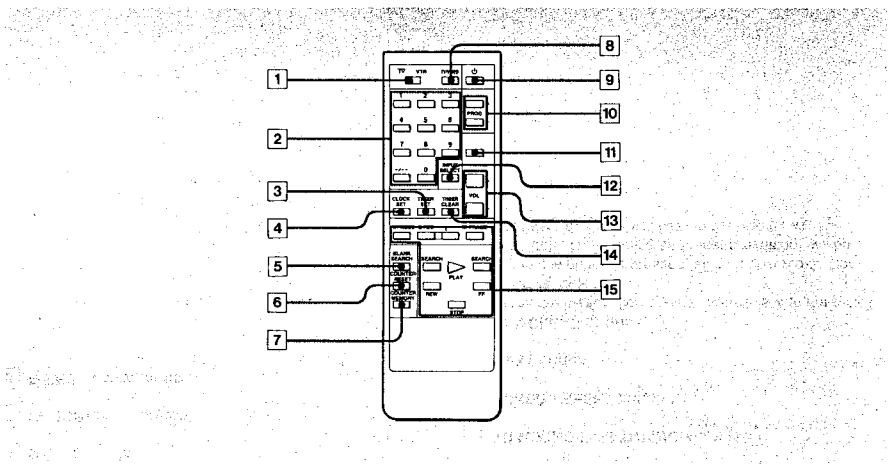
10 **M (memory) indicator**

11 **Linear tape counter**
Used also to indicate the timer-activated recording end time.

12 **DATE indicator**

13 ⏲ **(timer stand-by) indicator**
Appears while the VTR is waiting for the turn-on time of timer recording.

Remote Commander



1 **TV/VTR selector**
Set to the appropriate position according to the equipment to be operated.

2 **Number buttons**
To select a program number over 9, press –/– – (10's digit), then the appropriate number buttons.

3 **TIMER SET button**

4 **CLOCK SET button**

5 **BLANK SEARCH button**

6 **COUNTER RESET button**

7 **COUNTER MEMORY button**

8 **TV/VIDEO button**
When the TV/VTR is set to TV, press to select the input signal on the TV.

9 ⏻ **(power) switch**
When TV/VTR is set to VTR, press to turn on or off the VTR.
When TV/VTR is set to TV, press to turn off the TV.

10 **PROG (program) +/- buttons**

11 ▭ **(power) switch**
When TV/VTR is set to TV, press to turn on the TV.

12 **INPUT SELECT button**
Press to select the sources to be recorded.

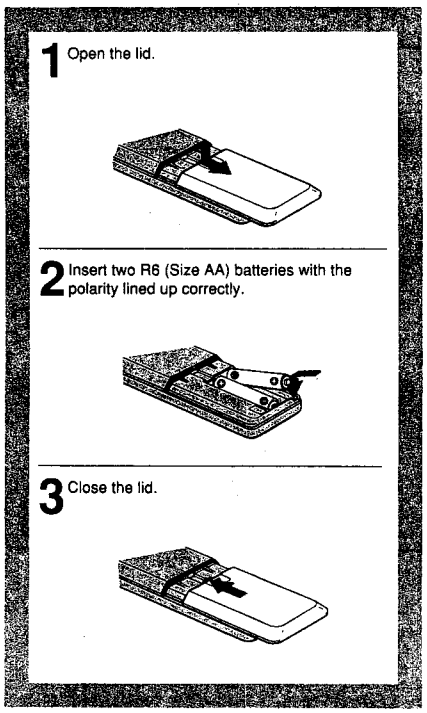
13 **VOL (volume) +/- buttons**

14 **TIMER CLEAR button**

15 **Tape transport buttons**
II PAUSE, ● REC and the recording auxiliary button (right side), **II► FRAME, ⏪/⏩ SEARCH (reverse/forward), ► PLAY, ◄◄ REW** (rewind), **■ STOP, ►► FF** (fast-forward)

Operating a TV
The buttons with the ● (orange) mark can operate the TV. Set the TV/VTR selector to TV and press any of the TV operation buttons.

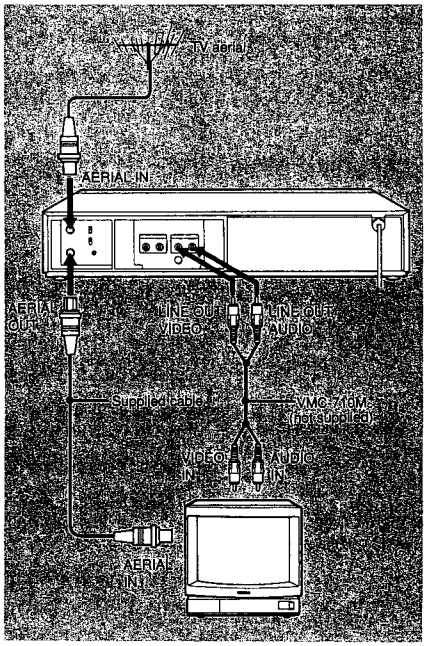
Battery insertion



Notes on the handling of batteries
- With normal operations, the batteries will last for approximately 6 months.
- If the Commander will not be used for a long period of time, remove the batteries to avoid possible damage from battery leakage.

Preparation

Connections

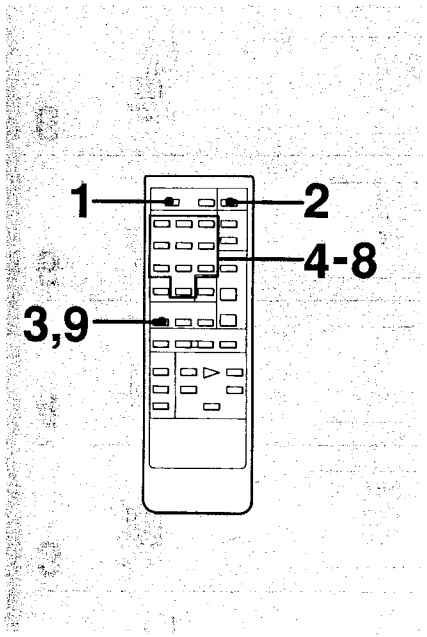


- Turn off the power of the unit and TV.
- Do not connect the AC power cord until all of the connections are completed.
- Connect firmly since a loose connection may cause picture distortion.

If your TV is equipped with video/audio input jacks, connect it to the VTR's LINE OUT VIDEO/AUDIO jacks to view a higher quality picture. To watch the playback picture, set the TV/VIDEO input selector on the TV to VIDEO.

* If a TV has the AUDIO L and R jacks, use a commercially available connecting cable like a Sony VMC-910MS.

Date and Clock Setting



For one-digit number
First press [0], then press the appropriate number.

To correct the date and clock

1 Turn on the power of the VTR.

2 Press CLOCK SET on the Commander.

3 Press PROGRAM (PROG) +/– on the Commander or VTR until the number to be corrected blinks.

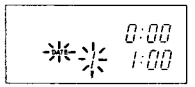
When "88:88" blinks in the display window
If the VTR is disconnected from the wall outlet, or if there has been a power interruption for longer than one hour, "88:88" will blink when the power is fed to the VTR again.
Set the date and clock again.

Example: To set to 17:30, April 20, 1991

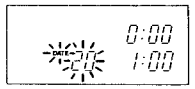
1 **Set TV/VTR to VTR.**

2 **Turn on the power.**

3 **Press CLOCK SET.**

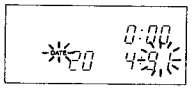


4 **Set the day.**

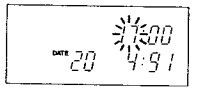


5 **Set the month.**

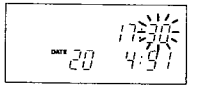
6 **Set the year.**



7 **Set the hour.**



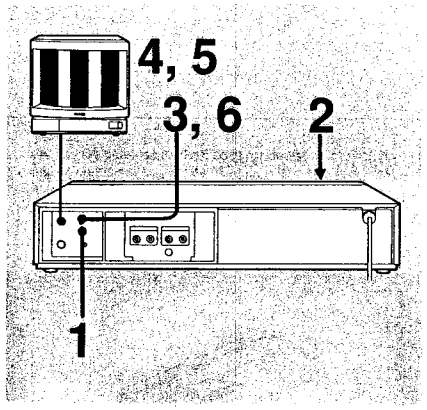
8 **Set the minutes.**



9 **Press CLOCK SET simultaneously with a time signal.**

Adjusting the TV

If you have connected your VTR and TV using only the aerial connector, one of the television program positions must be adjusted to receive the VTR's playback signal. If the connection of the TV and VTR is made by any other means, skip this step.



1 **Set TV SYSTEM to the position that conforms to the TV system of your area.**
D/K: For PAL D/K or SECAM D/K
B/G: For PAL B/G or SECAM B/G

2 **After making the connections, press ⏻ ON on the front.**

3 **Set TEST SIG. to ON.**
The test signal is transmitted on a channel between UHF channels 30 and 39.

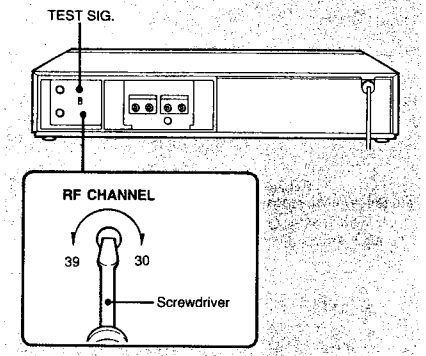
4 **Turn on the TV and select a program position which is not being used to receive a TV station.**

5 **Tune the channel until you see a clear test pattern on the TV screen and you hear a continuous tone.**

6 **Set TEST SIG. to OFF.**

Whenever you use the video recorder, you should set the TV to the program position selected in this adjustment.

If the test pattern is not free of disturbance



1 Reset TEST SIG. to OFF.

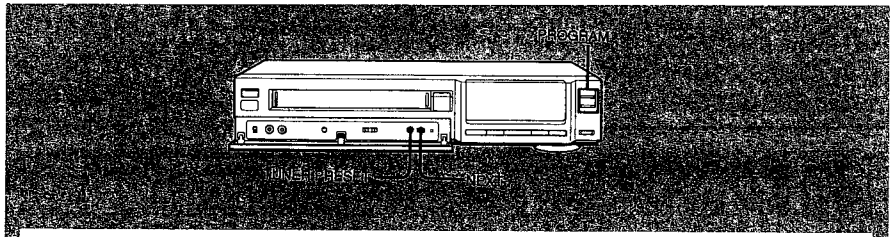
2 Adjust the channel of the TV to a channel between UHF channels 30 to 39 so that the TV screen shows no picture and so that no sound is heard.

3 Set TEST SIG. to ON.

4 Turn RF CHANNEL slowly until you see an undistorted test pattern on the TV screen.

5 Set TEST SIG. to OFF.

Presetting the Active Channels in Your Area



1 TUNER PRESET

2 PROGRAM — NEXT

3 PROGRAM — NEXT

4 PROGRAM

5 NEXT

6 TUNER PRESET

- Turn on the VTR and the TV.
- Make sure that the TV is set to the correct program position for the VTR.
- Check that the TV SYSTEM selector is set to the appropriate position according to the TV system in your area.

Presetting the Active Channels

1 **Press TUNER PRESET.**

2 **Press PROGRAM +/– until the desired program position number appears in the display window. Then press NEXT.**

3 **Press PROGRAM +/– until the desired band indicator appears in the display window. Then press NEXT.**

Refer to the following table for the band indicator and the corresponding channels.

Band indicator	Corresponding channels		
	PAL B/G SECAM B/G	PAL D/K	SECAM D/K
L	VHF 2 to 4	VHF C1 to C5	VHF R1 to R5
H	VHF 5 to 12	VHF C6 to C12	VHF R6 to R12
U	UHF 21 to 69	UHF C13 to C56	UHF 21 to 69

"S" will also appear at the band indicator position.
"S" should be selected to erase unwanted program position.
See page 12.

4 **Press PROGRAM +/–.**
A channel being used for a broadcast is found automatically.
If the channel is not the desired one, press PROGRAM + or – again.

5 **Then press NEXT.**
The selected channel is preset to the selected program position.

Repeat steps 2 to 5 to preset other channels to other program position.

6 **Press TUNER PRESET again.**
The display will return to the normal display.

Presetting the Active Channels in Your Area

Selecting TV Program Position

Keep pressing PROGRAM +/– until the desired station is tuned in.
For lower-numbered program positions, press "–", and for higher-numbered program positions, press "+".

Fine-tuning a weak station

Normally, the automatic fine-tuning function works when a station is tuned in. (The AFT indicator appears in the display window.)
If the picture of a particular channel is not acceptable, proceed as follows.

1 Select the unsatisfactory station by pressing PROGRAM + or –.

2 Press TUNER PRESET.

3 Press TRACKING/FINE TUNING ▼/▲ until the best possible picture and sound are obtained.
The AFT indicator is turned off.

4 Press TUNER PRESET.

Erasing Unwanted Program Positions

After presetting TV channels to the program positions, you can designate unwanted program positions so that the program positions will be skipped when you search for the channel with PROGRAM +/–.

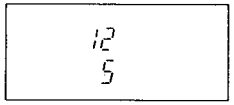
1 Turn on the VTR and the TV.

2 Press TUNER PRESET.

3 Press PROGRAM +/– until the program position number to be skipped appears in the display window.

4 Press NEXT.

5 Press PROGRAM +/– until "S" appears and blinks at the band indicator position in the display window.



6 Press NEXT.

7 Repeat steps 3 to 6 to designate another program position to be skipped.

8 Press TUNER PRESET.

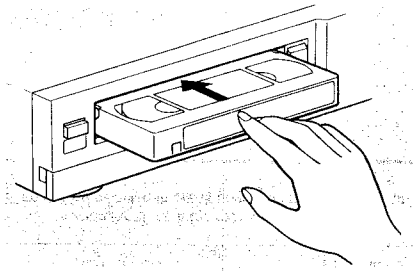
Cancelling the skip function

Preset again the TV channel to the program position which has been set to be skipped.

Handling Video Cassettes

Inserting a Cassette

Insert a cassette by gently pressing the center of the back of the cassette.
The power will be turned on automatically.



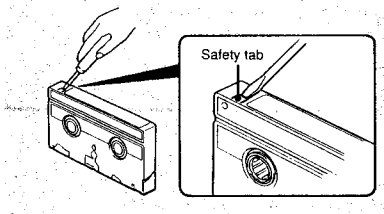
Ejecting a cassette

Press ▲ EJECT.
When the power is off and ▲ EJECT is pressed, the VTR is turned on automatically and the cassette is ejected. After which, the power is turned off automatically.

Note
While the VTR is in recording mode, press ■ STOP to stop recording and then press ▲ EJECT.

To Avoid Erasing a Recorded Tape

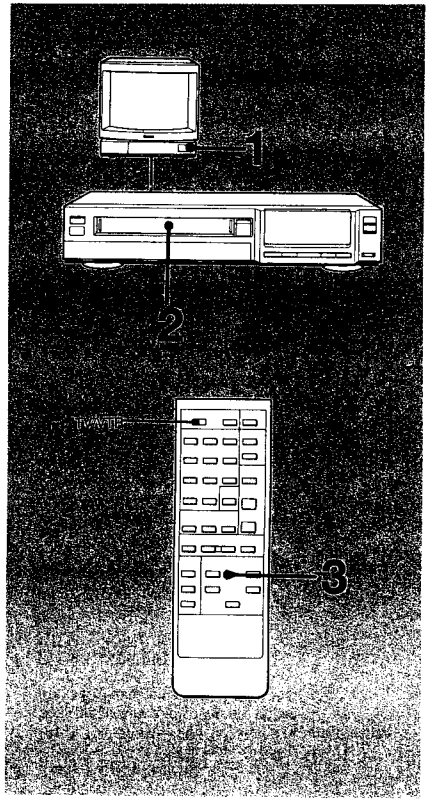
When a new recording is made on a previously recorded cassette, the old recording will be erased automatically. To avoid accidental erasure, break off the safety tab using a screwdriver or similar tool.



To re-record a cassette whose safety tab is broken off
Cover the slot with a piece of plastic tape, where the safety tab has been removed.

Operation

Playback



Before you begin:

Make sure that the TV/VTR on the Commander is set to VTR.

Playing back a tape

The VTR plays back a tape recorded in the SP mode only.

1 **Turn on the TV and select the program position for the VTR or select the input for the VTR.**

2 **Insert a cassette.**
The power is turned on automatically, and the ⟲ indicator appears in the display window.
If you insert a cassette whose safety tab has been broken off, playback will start automatically.

3 **Press ► PLAY.**
Playback begins.

Stopping playback
Press ■ STOP.

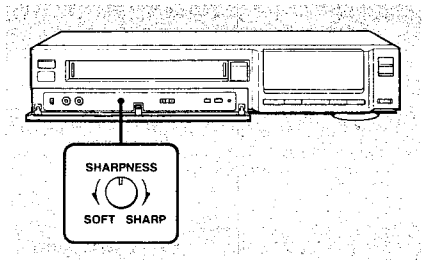
When the tape is played back to the end
The tape is automatically rewound to the beginning (auto rewind).
The power remains on.
If a cassette with the safety tab removed is used, the cassette will be automatically ejected after it has been rewound to the beginning.

To advance the tape rapidly.
Press ►► FF.
If the tape reaches its end, it will be automatically rewound to the beginning.

To rewind the tape.
Press ◄◄ REW.

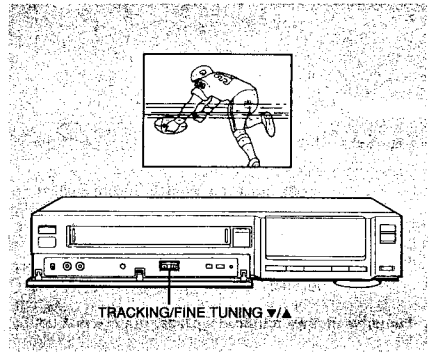
Note
Sufficient picture quality may not be obtained when playing back tapes recorded on another VTR, or tapes with unsatisfactory recording.

To Adjust the Sharpness of the Picture

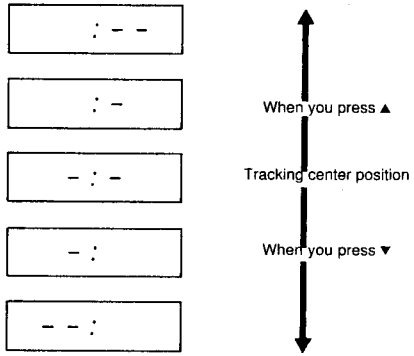


SHARP: To get a sharp picture
SOFT: To get a soft picture

If Streaks or Noise Bands Appear



Adjust TRACKING/FINE TUNING ▼/▲ on the VTR.
While adjusting the tracking, the tracking position indicator appears in the display window. The tracking position will be indicated as follows:



About three seconds after the button is pressed, the counter display will reappear.

To return to the tracking center position
Press both ▼ and ▲ buttons simultanously.

When a prerecorded tape with the copyguard system is played back
The intermittent distortion may appear in the upper portion of the picture. However it is not failure of this unit.

Various Playback Modes

Locked Picture Search

You can watch the picture while fast-forwarding or rewinding the tape.

During normal playback
Press ⏮/⏭ SEARCH on the Remote Commander.
To resume normal playback, press ▶ PLAY.

Picture Search

You can watch the picture at high speed as long as the specific button is kept pressed.

During normal playback
Press and hold ▶▶ FF or ◀◀ REW.
When you release the button, normal playback will resume.

During fast-forwarding the tape
Press and hold ▶▶ FF.
When you release the button, the tape will be fast-forwarded again.

During rewinding the tape
Press and hold ◀◀ REW.
When you release the button, the tape will be rewound again.

Playback Pause Picture

Press ⏸ PAUSE during normal playback.
To release the pause mode, press ▶ PLAY or ⏸ PAUSE.

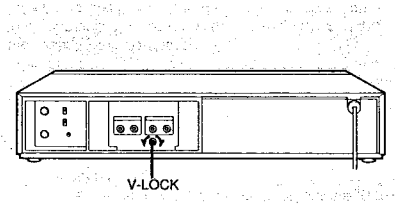
Note
If the playback pause mode lasts for more than approximately 5 minutes, the VTR enters the stop mode automatically.

Frame-by-Frame Picture

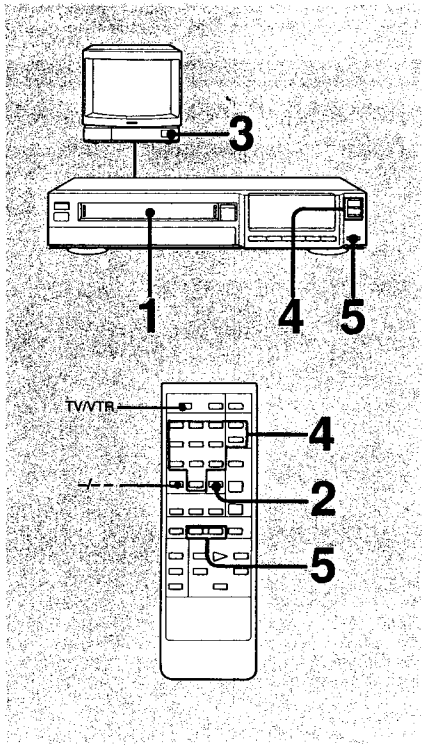
Press ⏸▶ FRAME on the Remote Commander in the pause mode.
Each time the button is pressed, the picture advances by 1/5 frame.If you keep pressing the button, the picture advances one frame every one second.

To View the Stable Picture

If the picture shakes in the playback pause mode, adjust the picture with V-LOCK control.



Recording TV Programs



Before you begin

- Make sure that you have finished all the connections and adjustments on pages 8 to 12.
- Make sure that TV/VTR on the Commander is set to VTR.

Recording

The VTR records in the SP mode only.

1 **Insert a cassette. The power is turned on automatically and the ⏏ indicator appears.**

2 **Press INPUT SELECT, if the AU indicator lights in the display window.**

3 **Turn on the TV and select the program position for the VTR or select the input for the VTR.**

4 **Select the program position to be recorded with PROGRAM +/– or number buttons.**
To select a program number over 9 with number buttons, press –/– –, then the appropriate number buttons.

5 **Press ● REC on the VTR, or press ● REC on the Remote Commander while pressing the recording auxiliary button.**
Recording will begin.

To stop the recording
Press ■ STOP.

When you want to record a program without watching the TV
Turn off the power of the TV or color monitor.
Recording takes place as normal.

To stop the tape momentarily during recording
Press II PAUSE.
To resume recording, press II PAUSE again.

To View One TV Program While Recording Another

Simply select the program you want to view on the TV.
If you do not connect a TV tuner together with the monitor, you cannot watch a TV program while recording another program.

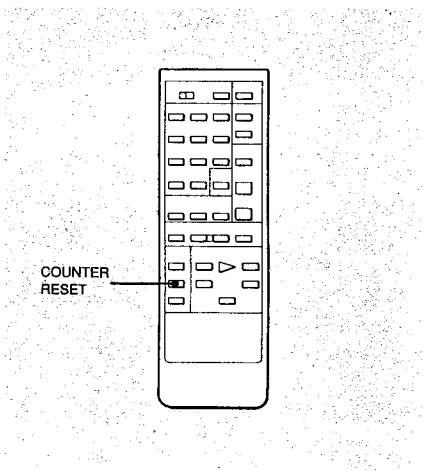
When the tape reaches its end
The tape is automatically rewound to the beginning (auto rewind).
The power remains on.

If the safety tab on the cassette has been broken off
The cassette will be ejected automatically when ● REC is pressed.

Use of the Tape Counter

The tape counter indicates the approximate running time of the tape and the relative position of programs on the tape.

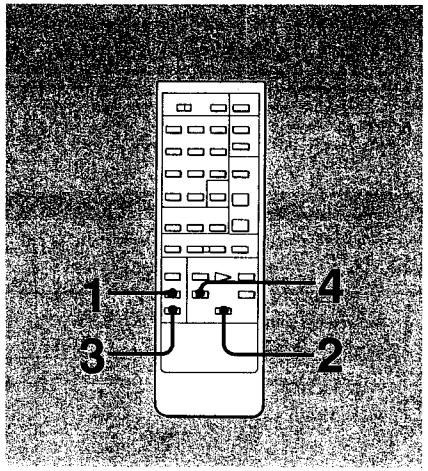
Indexing the Tape Contents



Before starting recording or playback, press COUNTER RESET on the Remote Commander to set the counter to "0H00M00S." By noting the counter reading at the desired point, you can easily find that point later by referring to the counter. Use the label on the cassette to list the programs and their counter readings.

Notes

- The counter reading is automatically reset to zero when a cassette is newly inserted.
- The counter reading will be retained in the memory even after the power is turned off, as long as the cassette is in the cassette compartment.
- The counter will not advance during any portion of the tape that is blank or unrecorded. So the counter can be used to find unrecorded sections on a tape.



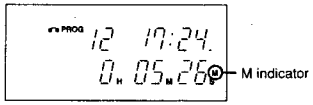
Locating the "0H00M00S" Position

The VTR can memorize the tape position when the counter shows "0H00M00S."
Once the position is memorized, the VTR stops automatically at that position after fast-forwarding or rewinding. Thus you can locate a particular point quickly.

1 **During playback or recording, press COUNTER RESET at the point you want to locate later.**
The counter will indicate "0H00M00S."

2 **When recording or playback is finished, press ■ STOP.**

3 **Press COUNTER MEMORY so that the M indicator appears.**



4 **Press ◄◄ REW to rewind the tape.**
The tape stops automatically at the position right before the "0H00M00S" point.

You can rewind the tape further by pressing ◄◄ REW again. The tape counter shows a negative value with a (–) sign. In this case, the "0H00M00S" position can be located by pressing ►► FF.

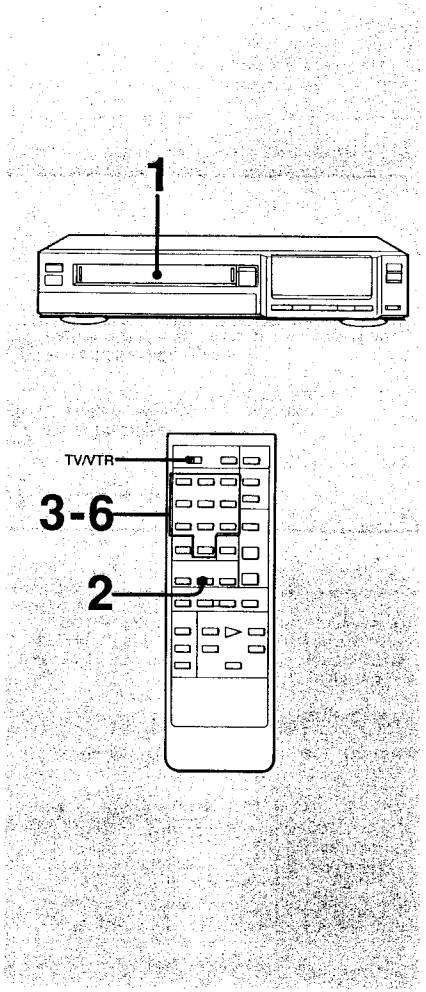
To cancel the "0H00M00S" position

Press COUNTER RESET on the Remote Commander.

The counter will not advance during any portion of a tape that is unrecorded.

Timer-Activated Recording

You can preset up to six recordings as much as one year in advance.



Before you begin

- The date and clock must be correctly. (See page 8).
- Make sure that the cassette tape is long enough to record all the programs.
- Be sure that the safety tab of the cassette has not been broken off.
- Set the TV/VTR on the Commander to VTR.

Timer Setting

Example: To set program 5 from 9:30 PM to 11:15 PM on December 21, 1990

1 **Insert a cassette.**
The power is turned on automatically.

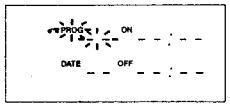
2 **Press TIMER SET.**

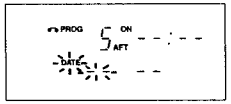
3 **Set the program position.**
For one-digit number, first press [0], then press the desired number.

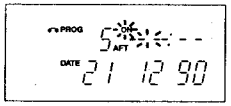
4 **Set the day, month and year.**

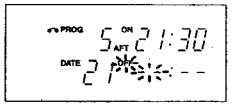
5 **Set the on-time.**

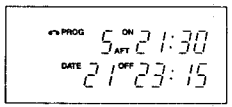
6 **Set the off-time.**
The VTR enters the time recording mode, and the ⏲ indicator will appear.









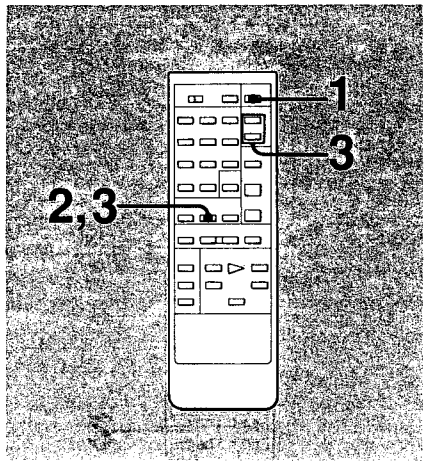


Problems on Timer-Activated Recording

Symptom	Possible Cause
After completing the setting, the ⏍ indicator blinks.	No cassette is inserted. Insert the cassette and turn off the VTR.
The cassette is ejected when the VTR is turned off after setting the timer.	The safety tab is broken off.

Timer-Activated Recording

Checking the Preset Time

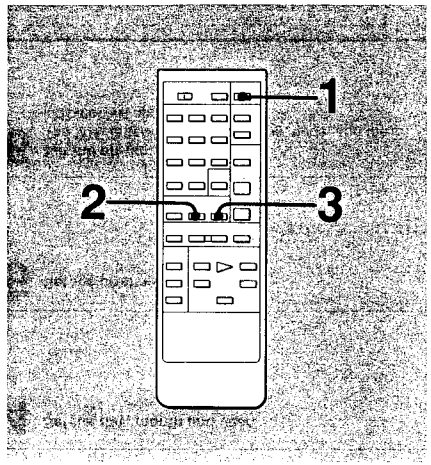


1 **Turn on the VTR.**

2 **Press TIMER SET.**
The VTR enters the timer setting mode.

3 **Press TIMER SET again.**
Each time TIMER SET is pressed, the preset timer settings will be displayed successively.
To check the month and year, press PROG + twice.
When TIMER SET is pressed at the last preset program, the checking mode will be released.

Cancelling the Timer Settings

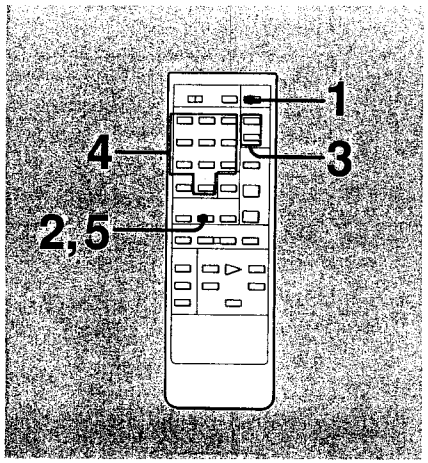


1 **Turn on the VTR.**

2 **Press TIMER SET until the program to be cancelled appears on the display window.**

3 **Press TIMER CLEAR.**
To cancel another program, repeat steps 2 and 3.

Changing the Timer Setting



1 **Turn on the VTR.**

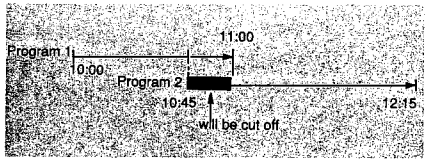
2 **Press TIMER SET until the program that you want to change appears.**

3 **Press PROG + or – until the item to be changed blinks.**

4 **Press the correct number buttons.**
For one-digit number, press [0], then press the appropriate numbers.

5 **After completing the setting, press TIMER SET.**
The VTR enters the time recording standby mode.

When the presettings of your timer-activated recordings overlap
The recording of program 2 will not begin until the recording of program 1 is completed.

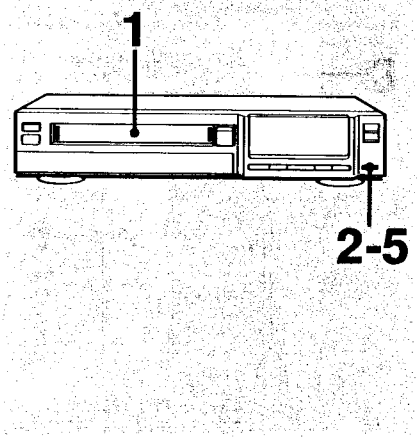


When the tape has reached its end
Recording stops, but the tape will not be rewound to the beginning.

Notes
- If a power interruption of one hour or more occurs while the VTR is waiting for the preset time, the memory will be cleared. Reset the clock and preset the data for timer-activated recordings again.
- If a power interruption of less than one hour occurs during a timer recording, the VTR will start recording again when power is fed, and the tape counter will indicate "0H00M00S."
- If a power interruption of more than one hour occurs during a timer recording, recording will stop.

Quick Start Recording

The quick start recording function provides a simplified timer-activated recording procedure.
Using this function, you can start recording a TV program immediately and leave the VTR right away.
The recording end time can be set for up to 24 hours by 30 minute interval.



If you do not press ● REC during the OFF indication blinks
The OFF indicator goes off, and the recording continues to the end of the tape unless you stop recording.

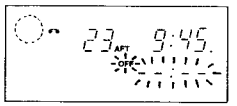
When the tape reaches its end
Recording stops, but the tape will not be rewound to the beginning.

Start Recording

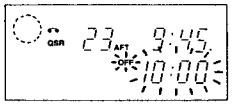
1 **Insert a cassette.**

2 **Start recording.**

3 **Press ● REC again.**
The OFF indicator blinks in the display window.



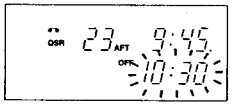
4 **Press ● REC during the OFF indicator blinks (for about 10 sec.)**
The QSR indicator appears.



5 **Set the recording end time by pressing ● REC.**
Each time ● REC is pressed, the recording end time will be incremented by 30 minutes.

Example: To set the recording end time at 10:30 while you start the quick start recording at 9:45.
Press ● REC twice.

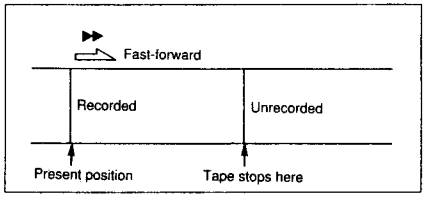
9:45
⬇
10:00 ➡ 10:30



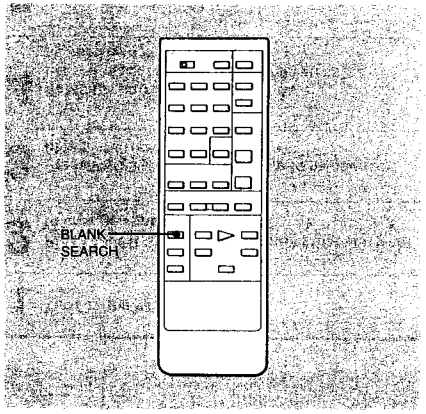
You can leave the VTR, and the recording stops when the preset recording duration has elapsed.

To stop the recording
Press the ■ STOP button.

Blank Search Function



You can easily locate the beginning of the blank portion of a partially recorded tape.
It is convenient to start recording continuously on the pre-recorded tape without a blank, or when you make a new recording on a previously recorded tape, to find the end of the new recorded portion.



Press BLANK SEARCH in the stop or playback mode. The TO indicator appears in the display window.

The tape advances rapidly and automatically stops at the end of the recorded portion.

Notes

- If a blank tape or tape without a blank is used, after the VTR searches the blank to the tape end and start searching toward towards the beginning of the tape, the tape stops at the beginning.
- The stopping position may vary slightly.

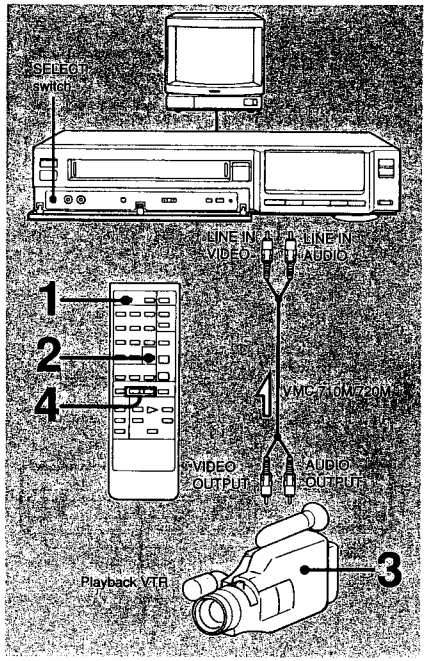
Editing

Tape Editing

To edit a home movie tape, you need video cassette recorders.

Editing Home Movie Tapes from Another

Connect another VTR to the front or rear LINE IN VIDEO/ AUDIO jacks of this VTR and select the input with SELECT according to the connected equipment.



Operation

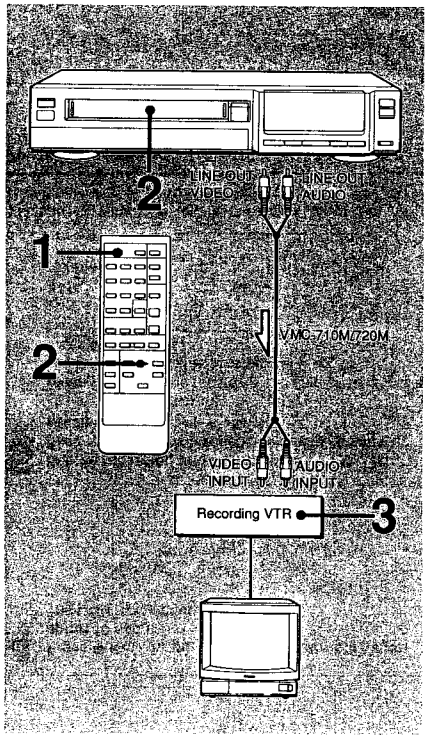
1 Set TV/VTR to VTR.

2 Press INPUT SELECT so that the AU indicator lights in the display window.

3 Insert a recorded cassette into the other VTR and start playback.

4 Start recording with this VTR.

Editing Home Movie Tape onto Another VTR



Operation

1 Set TV/VTR to VTR.

2 Insert a recorded cassette into this VTR and start playback.

3 Set the INPUT SELECT switch to LINE and start recording with the other VTR.

If the other VTR has audio L and R jacks, use a commercially available connecting cable like a Sony VMC-910MS/920MS.

Troubleshooting

If any difficulty should arise during operation, first check the power cord connection, then go through the following list. Should the difficulty persist, unplug the unit, and contact your Sony dealer or local authorized Sony service facility.

	Symptom	Possible causes and remedies
Power	The power is not turned on even if ⏻ is pressed.	• The power cord is disconnected. • The TV/VTR on the commander is not set to VTR.
	The power is turned on, but the unit does not operate.	• The safety device on the unit has been activated. Press ALL CLEAR on the Commander or turn the power off, disconnect the power cord from the wall outlet and leave the unit turned off for more than 1 hour.
	The power is turned on, but no indicators appear in the display window or they are not displayed correctly.	• Press ALL CLEAR or disconnect the power cord from the wall outlet.
Clock and timer	The clock has stopped and the "88:88" is blinking.	• There has been a power interruption. Reset the date, clock time and timer setting.
TV reception	TV program is not clearly displayed on the TV screen.	• The program position for VTR is not correctly tuned on the TV. • The TV signal is weak. Adjust the direction of the antenna. • The AC power cord of the VTR is disconnected.
Recording and playback	Noisy picture during recording.	• The TV's program position is not set to that preset for the VTR. • The TV signal is weak. Adjust the direction of the antenna.
	No picture on the TV screen.	• The channel for the VTR is not correctly tuned on the TV.
	Recording cannot be made.	• No cassette has been inserted. • The tape is at its end. • INPUT SEL is not set correctly. For TV program recording, press INPUT SEL so that the AU indicator does not light.
	The playback picture is not clear.	• The program position for the VTR is not correctly tuned on the TV. • A tape recorded on another VTR is being played back. Adjust TRACKING. (See page 15.) • The video heads are dirty. Clean the heads using the Sony T-25CL video head cleaning cassette. For details on cleaning, refer to the instructions furnished with the cleaning cassette. If the cleaning cassette is not available in your area, have the heads cleaned at the nearest Sony facility. • If you used a commercially available wet-type cleaning cassette, it may have damaged the video heads. • The video heads are worn out. • Adjust SHARPNESS. (See page 15.)
	The picture moves vertically during picture search mode.	• Adjust the vertical hold control on the TV or color monitor.
	Sound drop-out	• The tape is defective. Use a new video cassette tape.

	Symptom	Possible causes and remedies
Timer recording	Timer setting cannot be made.	• The current time has not been preset.
	After completing the setting, the ⏲ indicator blinks.	• No cassette is inserted. • The tape is at its end.
	The cassette is ejected when the VTR is turned off after setting the timer.	• The safety tab is broken off. Cover the slot with plastic tape to re-record the cassette or use a new one. (See page 13.)
	Timer recording was not made.	• There has been a power interruption of one hour or more. Set the clock and the data for timer-activated recording again.
Others	Cassette cannot be inserted.	• Another cassette has been inserted.
	The Remote Commander cannot be operated.	• The batteries are exhausted.
	A mechanical noise is heard in the stop mode.	• When a cassette is inserted and the VTR is left in the stop mode with the power turned on for about 5 minutes, the tape protection mechanism will be activated automatically and a mechanical noise is heard.

SECTION 2
DISASSEMBLY

2-1. REMOVAL OF UPPER CASE

It is widen on both sides the back of upper case and remove up direction.

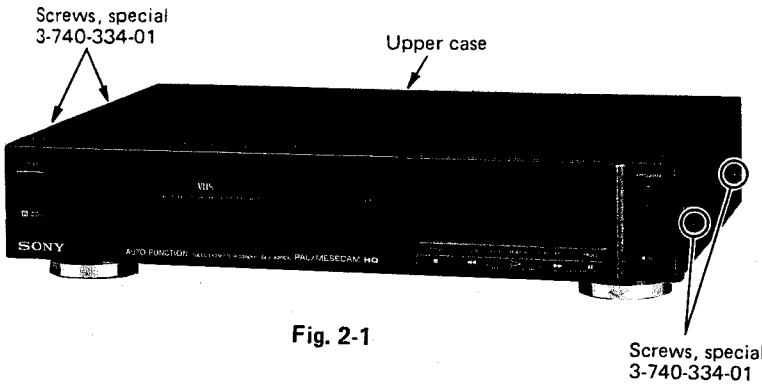


Fig. 2-1

Then remove the upper case.

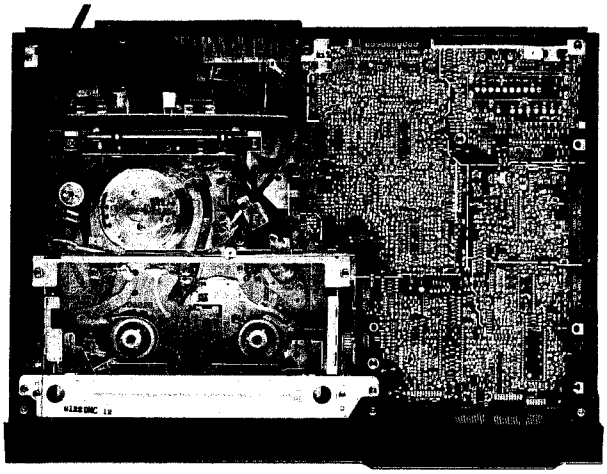


Fig. 2-2

2-2. REMOVAL OF BOTTOM PLATE

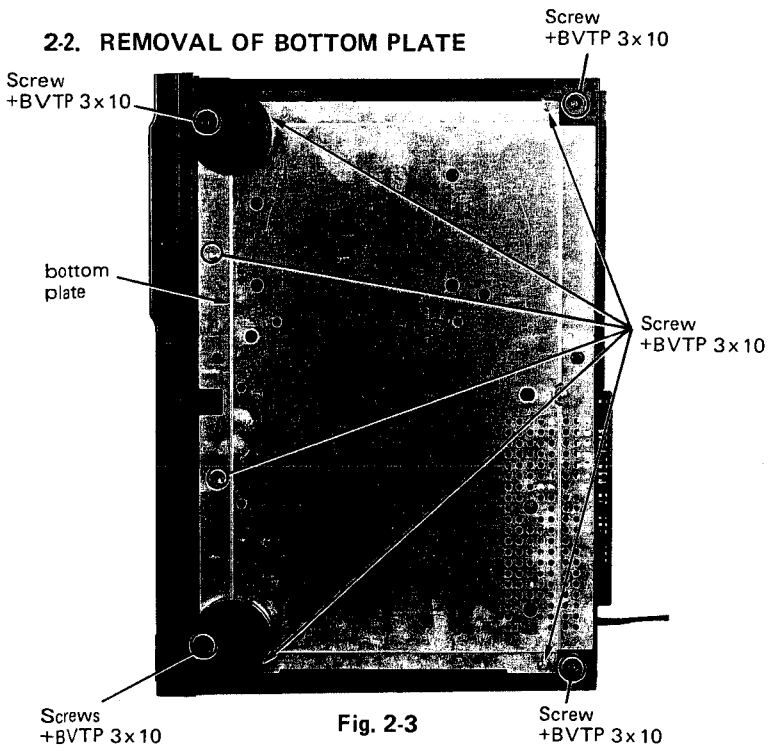


Fig. 2-3

Then remove the bottom plate.

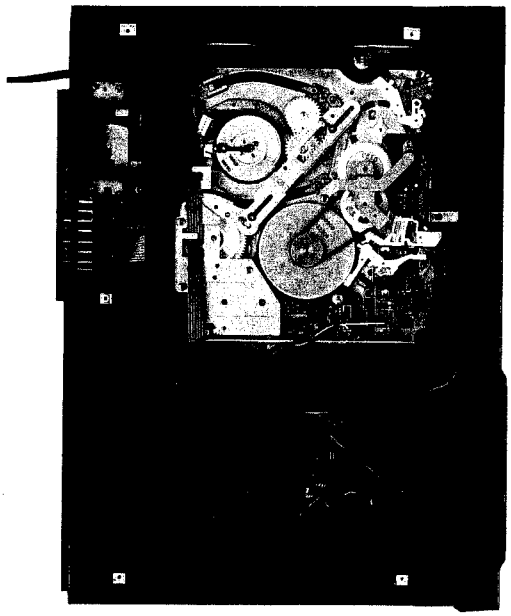
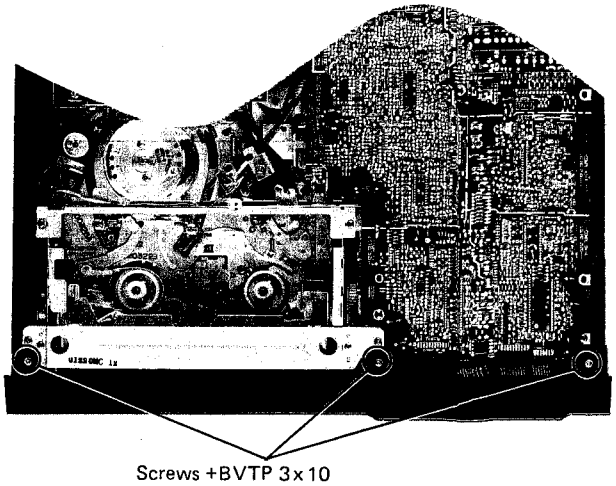


Fig. 2-4

2-3. REMOVAL OF FRONT CABINET

Then remove the upper case, and screws (+BVTP 3x10), bottom plate and raise up the claws (three places) front cabinet as shown by Fig. 2-5, and remove front cabinet in the arrow direction.



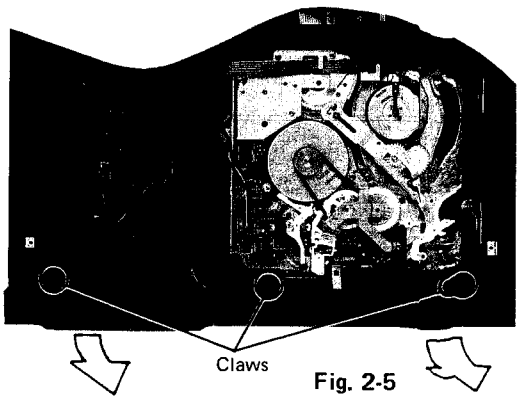
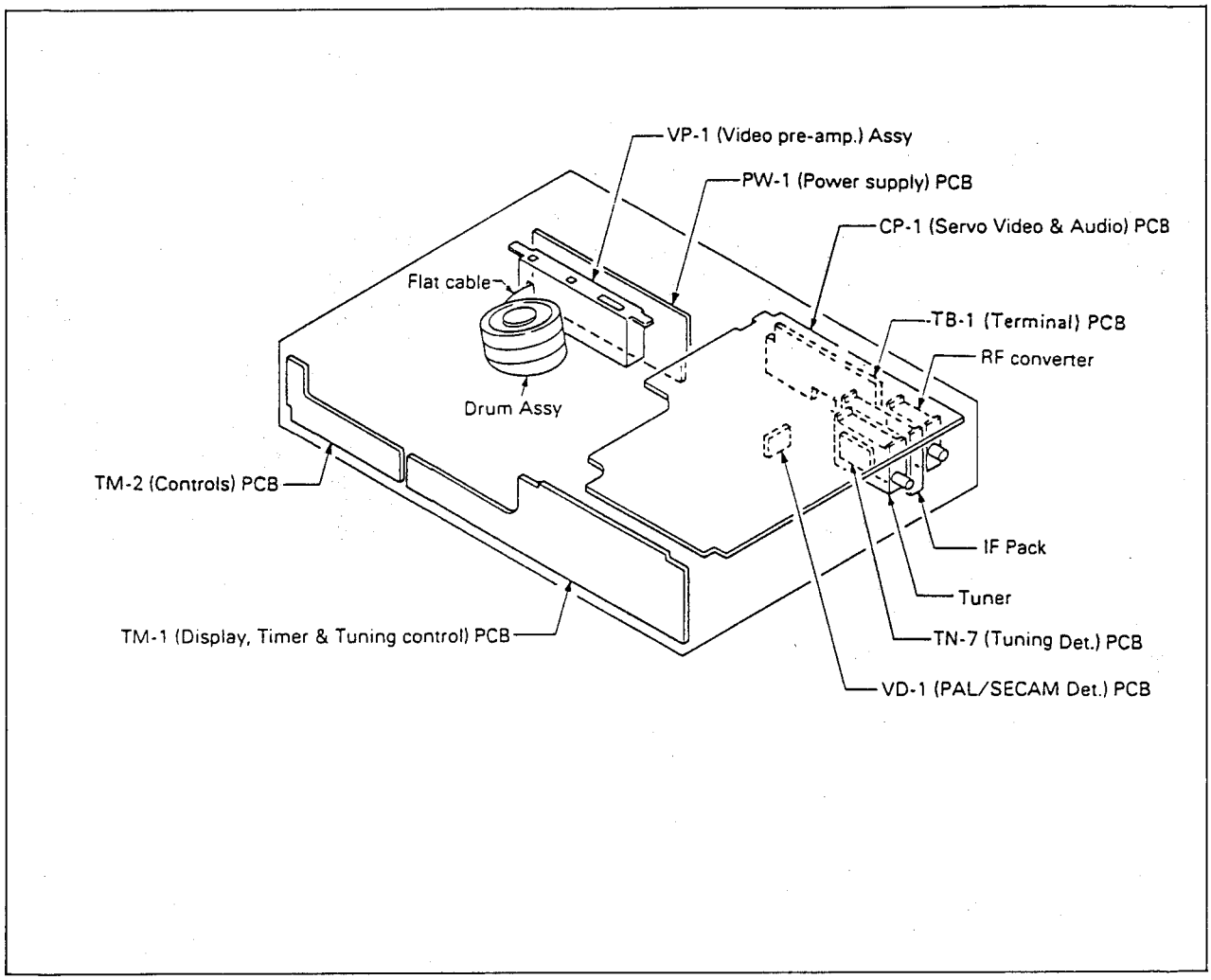


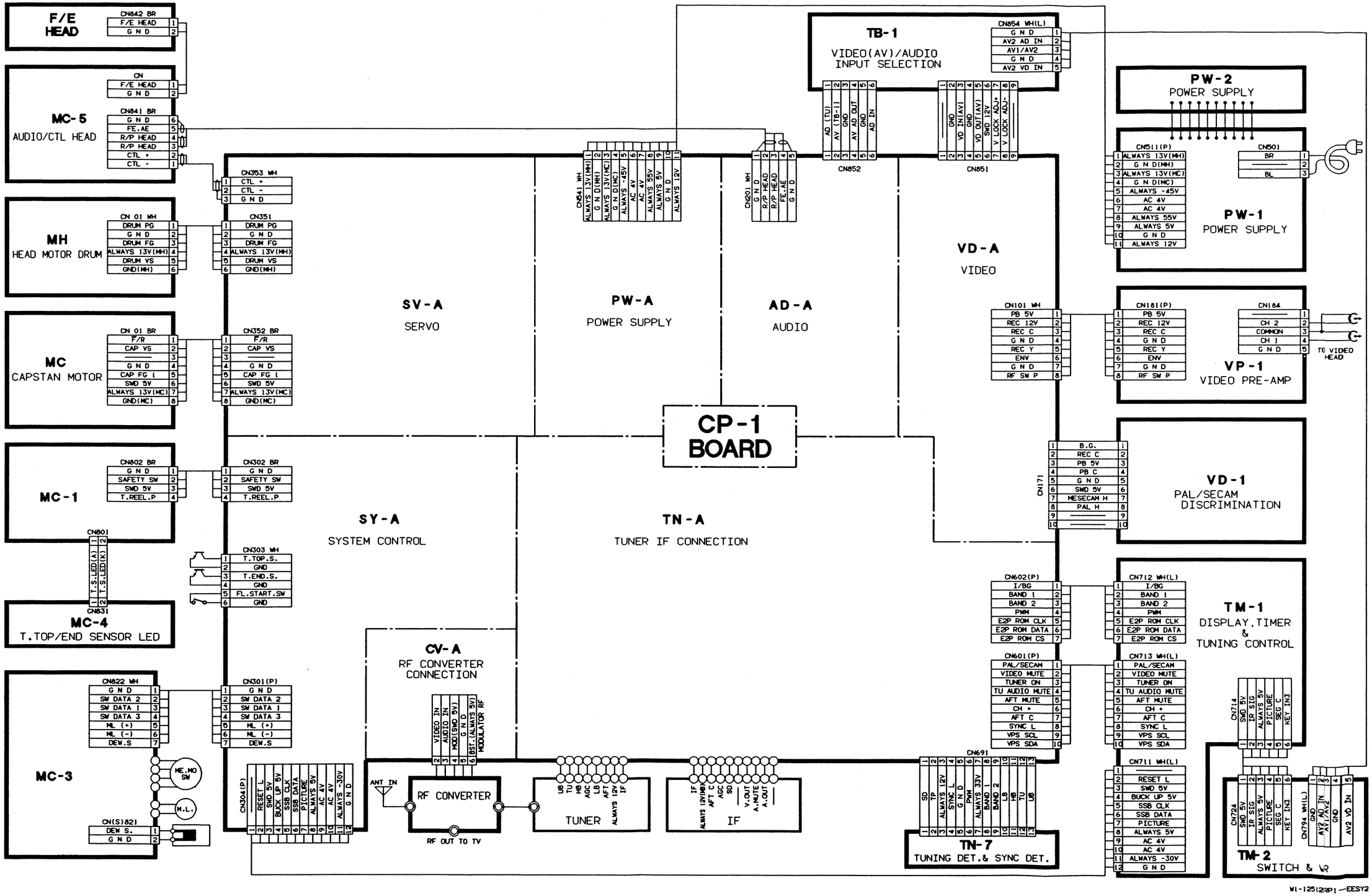
Fig. 2-5

SECTION 3
DIAGRAMS

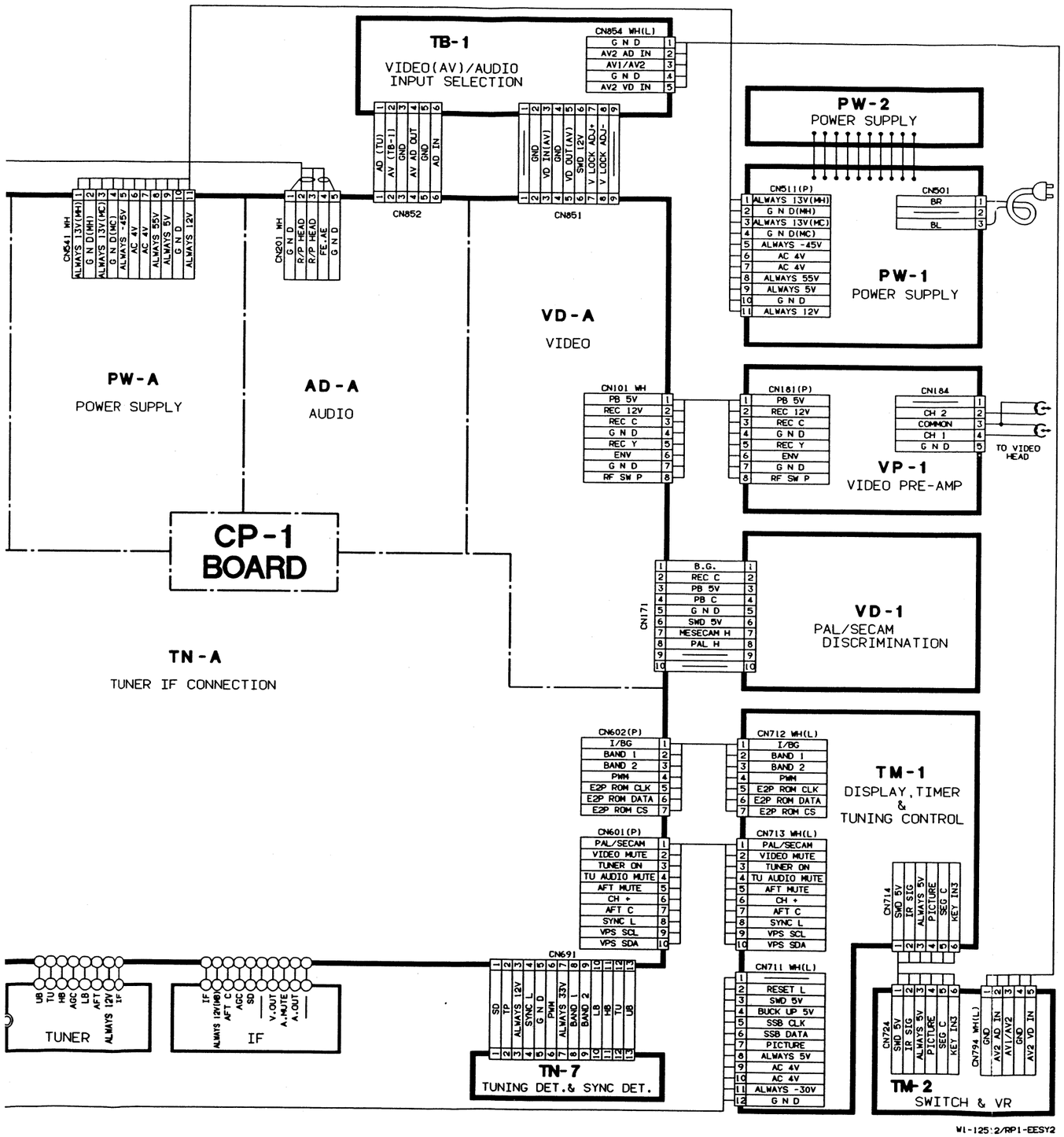
CIRCUIT BOARD LOCATIONS



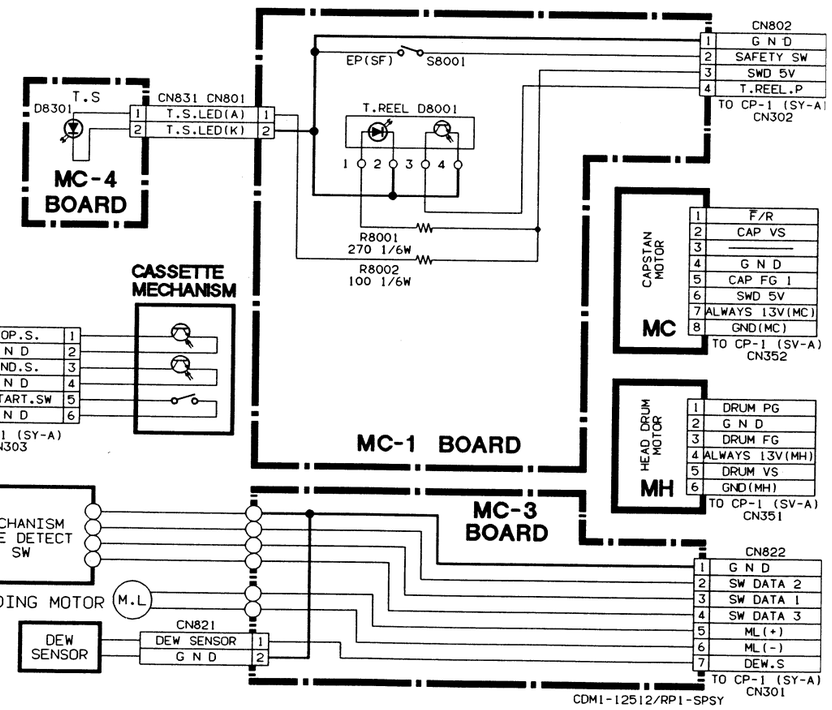
OVERALL WIRING DIAGRAM



OVERALL WIRING DIAGRAM



MECHANISM CONNECTION CIRCUIT



VIDEO CIRCUIT BASIC BLOCK DIAGRAM

CP-1 BOARD

IC101 (LA7340) Y-SIGNAL PROCESS

PRE AMP UNIT.

IC181 (LA7320) REC/PRE.AMP

HEAD DRUM

CH1 V-HEAD CH2

R.T

AMP

SW REC ON

L H

RF SW P

REC CURRENT CHECK TP181

ENV. TP182

ENV.OUT

RF. 3 ENVELOPE OUT

Q1052~Q1055 EQ AMP

PB Y-FM 26

P.B FM IN

FM AGC

8MHZ H.P.F

3MHZ L.P.F

LIM

MIX

FM DEMOD.

L.P.F

P.B

REC

XF101 L.P.F 3MHZ

Q1002 Q1003 AMP.

Q1001 BUFF.

VR101 P.B LEVEL

CLAMP

D.O.C DET.

DL

AGC 2

AMP

D.O.C PULSE

AGC

AGC 1 DET

DELAY

Q1031 BUFFER

VR105 N.C.ADJ

L1031 C1037~C1039 L.P.F

X2FSC

15 CCD 1H-DL 10

CORRELATION

AMP

LIM

D.O.C & NOIS CANCELL

D.O

NORMAL

NL DE-EM

PB 5V

REC 12V

PB H

ST.SL.×2

B1001

C1024

C1025

RF SW P.

VR182

FILTER

REC-Y

VR181 REC.C

CURRENT AMP

Y/C MIX AMP

PB ON

RF SWITCHING PULSE

TP183 RF SW P

REC (Y-FM)

REC

FM OUT

1/2 fs CARRIER SHIFT

FM MODULATOR

5V DC

VR103 CARRIER

VR104 DEV.

WHITE/ DARK CLIP

MAIN EMPHASIS

NL EMPHA

DETAIL EMPHA

REC(Y)

ATT

AGC. AMP

REC/EE VIDEO IN

VIDEO SIGNAL IN

PB 5V

ST.SL.×2

CP-1 BOARD

IC111 (LA7332) CHROMA PROCESS

IC861 (TB-1 BOARD)

AV1 VIDEO IN

AV2 VIDEO IN

AV1/AV2

IC161 (LA7221) INPUT SELECT

TUNER VIDEO IN

MUTE

INPUT VIDEO SIG.

EXT H

PB 5V

L1104,L1105 C1124,C1125 C1281

L.P.F

BUFFER

Q1005,Q1006

PB C

B1201 SYSTEM SW C1201

PAL H

Q1101 BUFFER

XF111(2/3) 1.4MHZ L.P.F

REC C

PB CHROMA IN

64B AMP

A.C.C AMP.

A.C.C DET.

BURST EMPHA DE-EMPHA

627KHZ

4.43MHZ

CARRIER BALANCE

MAIN CONVERTER

5.06MHZ

VIDEO IN

XF111(1/3) 4.43MHZ B.P.F

Q1151 Q1103~Q1104 AMP

DL131 COMB FILTER

P.B ACK

P.B CHROMA OUT

KILLER

REC-C

R/P

R/P DET

CHROMA OUT

627KHZ

XF111 (3/3) 5.06MHZ B.P.F

ACK DET.

BURST ID-DET.

REC APC

CONTROL

4.43MHZ VXO

4.43MHZ XO

4.43MHZ X-T X1101

3rd LOCK PROTECT

FSC

Q1102 BUFFER

SUB CONVERTER

CW 4.43MHZ

REC AFC

PB APC

B-ID LOGIC

90° PHASE SHIFT (PS)

B-ID

HD

SW 25

RF SW P

SIGNAL DET.

LP

SW 25

MESECAM H

N/P/S DET.

1/8

5.06MHZ VCO

CONTROL

R1102,R1104 C1105,C1106 INTEG-RATION

MISLOCK OUT

PB SLD

PLL LOCK

PULSE GEN.

C-SYNC IN

BGP 1

BGP 2

X2

X2FSC TO IC102 1H

VIDEO CIRCUIT BASIC BLOCK DIAGRAM

CP-1 BOARD

IC101 (LA7340) Y-SIGNAL PROCESS

P.B FM IN → FM AGC → 8MHZ H.P.F → LIM → 3MHZ L.P.F → MIX → FM DEMOD. → L.P.F → P.B REC → XF101 3MHZ L.P.F → Q1002 Q1003 AMP. → CLAMP → P.B REC → CORRELATION / AMP / LIM / LIM → D.O.C & NOIS CANCELL → NL DE-EMPHA → NOISE CANCELL → PICTURE CONTROL → 6dB AMP → Y/C MIX → SYNC AMP → P.B REC → F.B. CLAMP → VIDEO AMP → DRIVE → VIDEO OUT

Q1001 BUFF. → CLAMP

D.O.C DET. → DL → AMP → D.O.C PULSE

AGC 2

AGC → AGC 1 DET → DELAY → SYNC SEP. → L.P.F

D.O NORMAL

REC P.B → P.B CHROMA → MUTE OR VD-INSART

REC (Y-FM) ← 1/2 fh CARRIER SHIFT / FM MODULATOR ← 5V DC → VR103 CARRIER / VR104 DEV. → WHITE/DARK CLIP → MAIN EMPHASIS → NL EMPHA / DETAIL EMPHA → REC(Y)

REC FM OUT

REC/EE VIDEO IN ← ATT ← AGC. AMP ← AGC CONT.

REC (VIDEO Y/C)

SYNC OUT / CONTROL IN / CHROMA IN / VD IN

VIDEO SIGNAL IN

PB 5V

ST.SL.×2

Q1031 BUFFER ← VR105 N.C.ADJ ← L1031 C1037-C1039 ← L.P.F ← 15 X2FSC ← CCD 1H-DL ← 10 **IC102**

Q1601 BUFFER → VIDEO OUT TO AV

Q1602 BUFFER

Q6003 B6003 C6008 MOMENTARY MUTE → V.MUTE (TM-1)

→ VIDEO OUT TO RF-CONV.

→ V-LOCK PULSE (VLP) IN FROM SERVO

→ PICTURE CONTROL VR

→ COMPOSITE SYNC. TO SERVO

CP-1 BOARD

IC111 (LA7332) CHROMA PROCESS

PB CHROMA IN → 6dB AMP → P.B → A.C.C AMP. → BURST EMPHA DE-EMPHA → P.B 627KHZ REC 4.43MHZ → CARRIER BALANCE / MAIN CONVERTER 4.43MHZ 5.06MHZ → VIDEO IN REC P.B → XF111(1/3) 4.43MHZ B.P.F → Q1151 Q1103-Q1104 AMP → DL131 COMB FILTER → AMP → P.B ACK / P.B CHROMA OUT → P.B CHROMA → VR102 SWD 5V EE LEVEL → P.B CHROMA

REC-C

R/P → R/P DET

A.C.C DET. → REC P.B

REC CHROMA OUT → KILLER 627KHZ → KILLER

REC-C

KILLER → ACK DET. → BURST ID-DET.

XF111 (3/3) 5.06MHZ B.P.F → SW

REC APC → CONTROL → 4.43MHZ VXO / 4.43MHZ XO → 4.43MHZ X-TAL X1101

4.43MHZ CW → REC P.B → 3rd LOCK PROTECT → FSC → Q1102 BUFFER → 4.43MHZ FSC SIGNAL TO SERVO

REC AFC → REC P.B → PB APC

SUB CONVERTER CW 4.43MHZ → 4.43MHZ CW

627KHZ

SIGNAL DET. → LP / SW 25

SW 25 → 90° PHASE SHIFT (PS) B-ID HD → B-ID LOGIC

HD → BGP 2

X2 → X2FSC TO IC102 1H-DL

1/8 → 5.06MHZ VCO CONTROL

R1102,R1104 C1105,C1106 INTEG-RATION → MISLOCK OUT → PLL LOCK → PB SLD

PULSE GEN. → BGP 1 / C-SYNC IN → C-SYNC

N/P/S DET.

B.G → Q1701 R1701 R1702 B.G.P. DET.

VD-1 BOARD

IC171 (BA7025L) PAL/SECAM DISCRIMINATION

REC C → CHROMA IN L/H → BUST GATE AMP → XF171 4.16MHZ FILTER → DET. → COMP 1 → INTEG-RATION → COMP 2 → OUTPUT TO CHROMA PROCESS → MESECAM H / PAL H

PB C / PB 5V → BGP IN

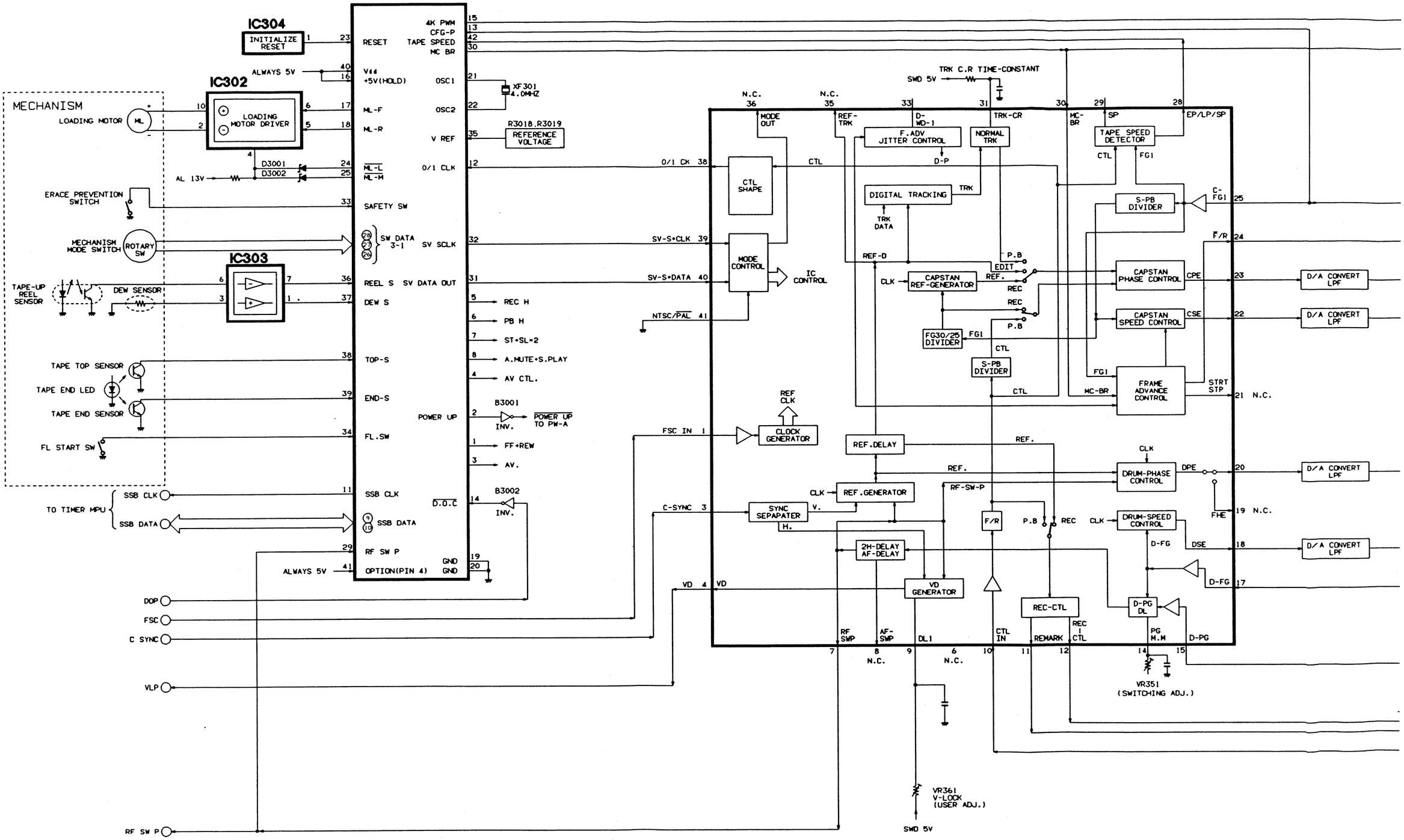
XF172 1/2fh PEAKING

BDV1-13015/RP1-EESY2

SYSTEM CONTROL & SERVO CIRCUIT BASIC BLOCK DIAGRAM

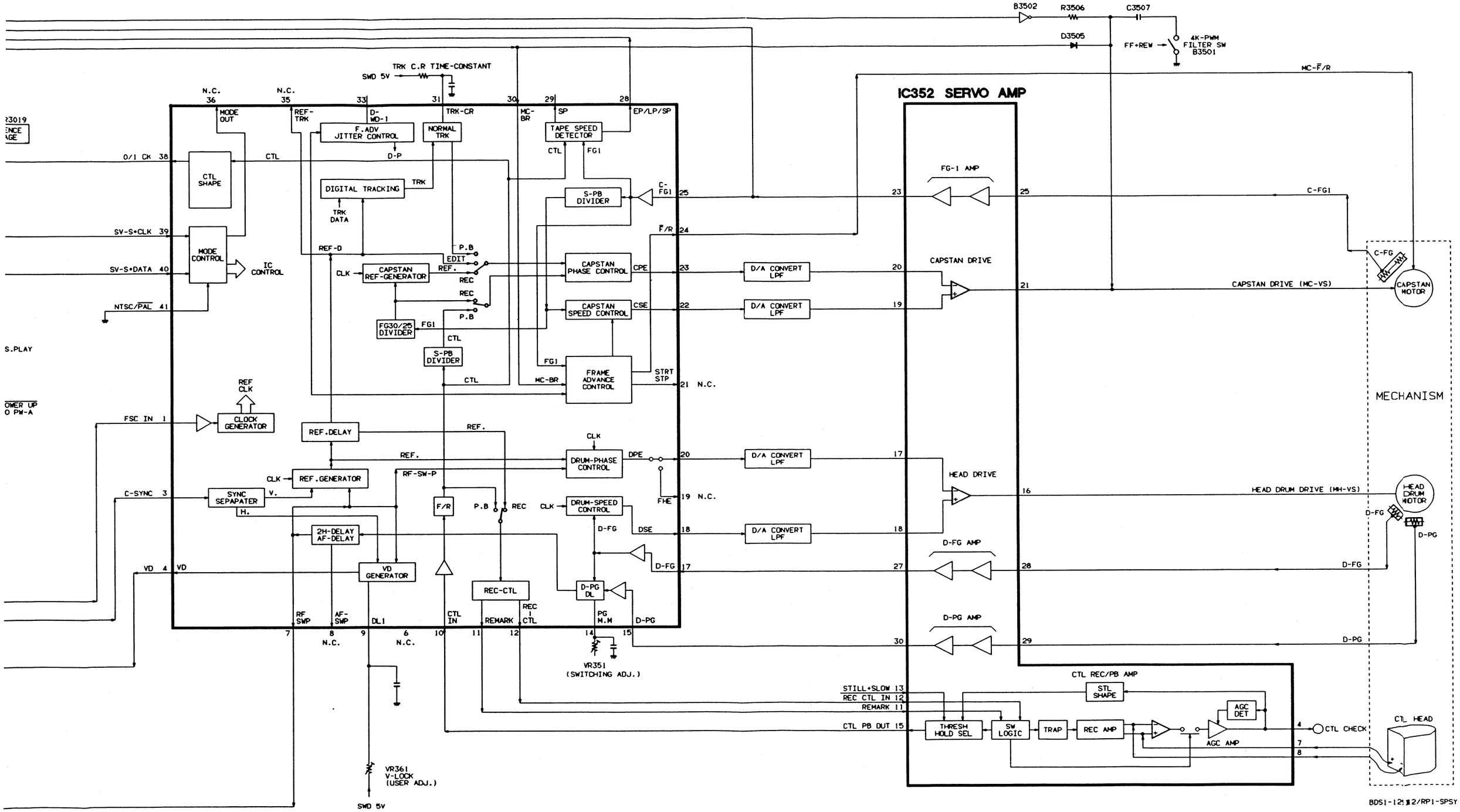
IC301 SYSTEM-CONTROL

IC351 DIGITAL SERVO



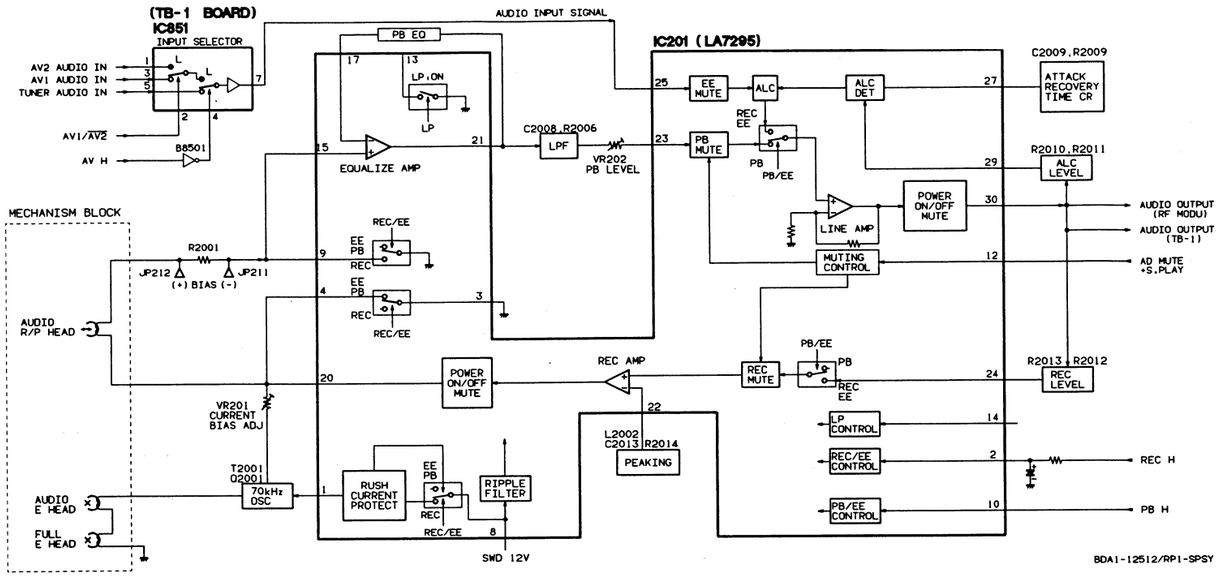
SYSTEM CONTROL & SERVO CIRCUIT BASIC BLOCK DIAGRAM

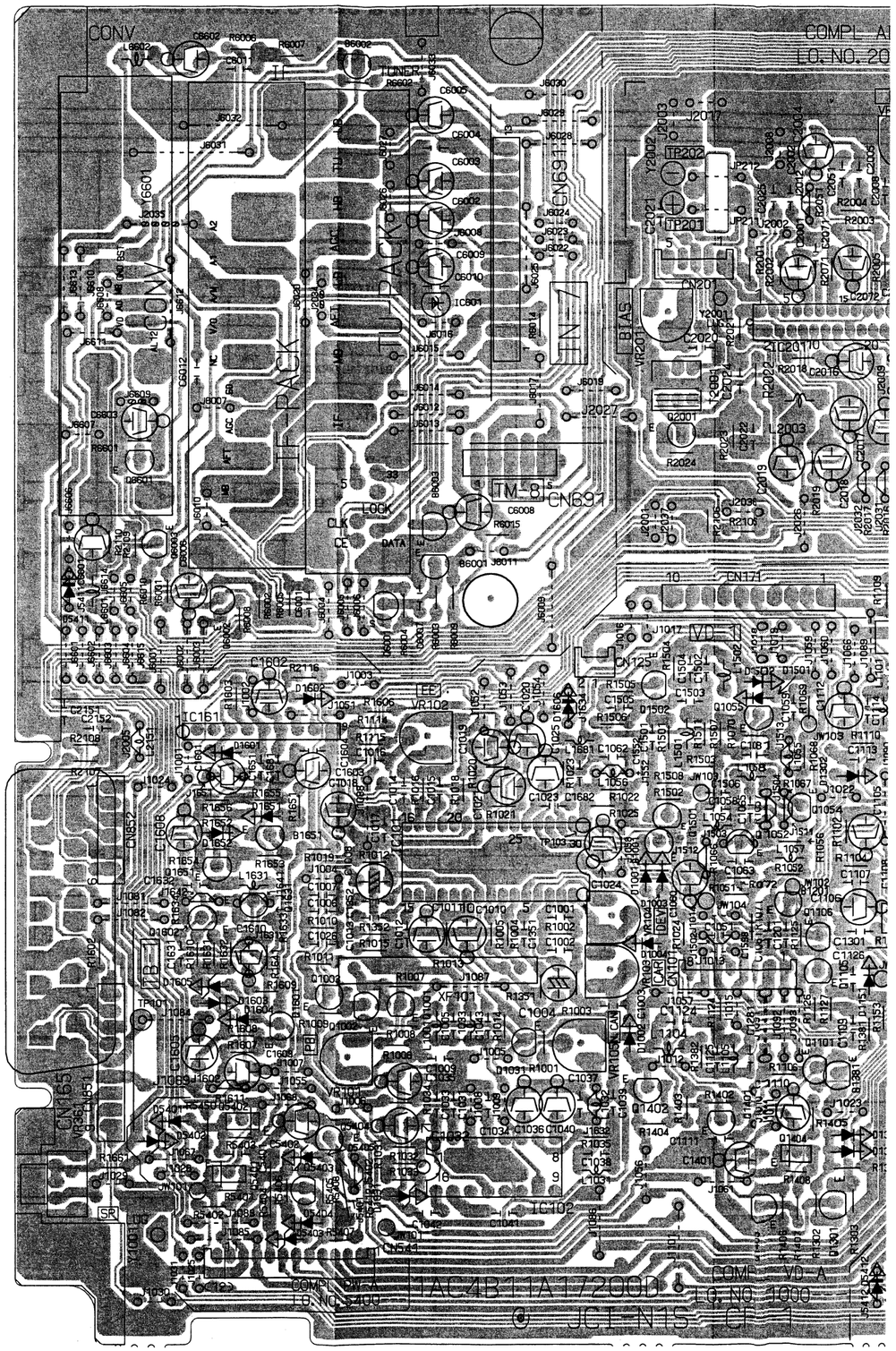
IC351 DIGITAL SERVO

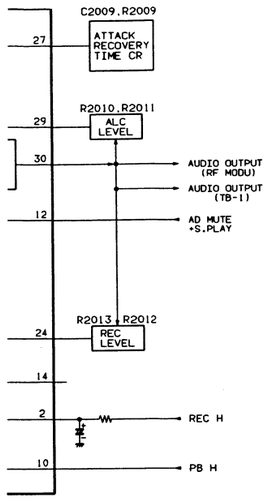


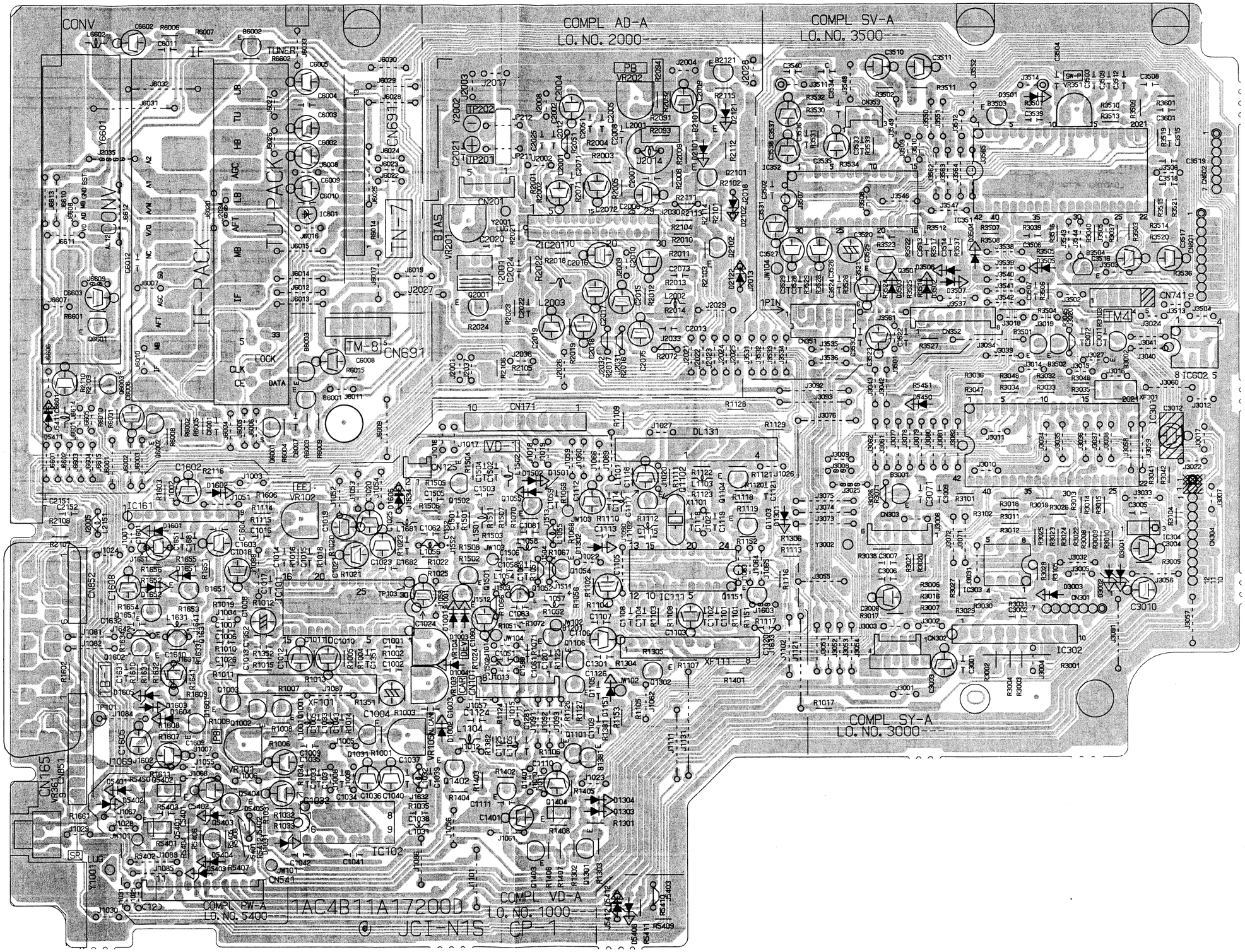
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

AUDIO CIRCUIT BASIC BLOCK DIAGRAM

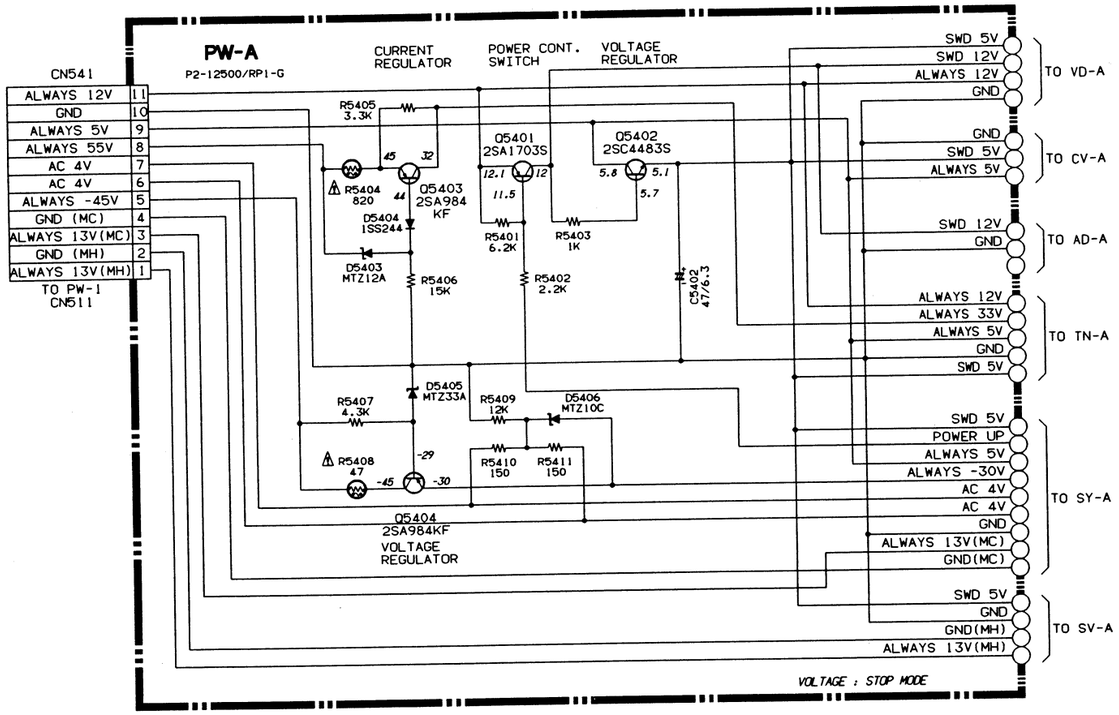




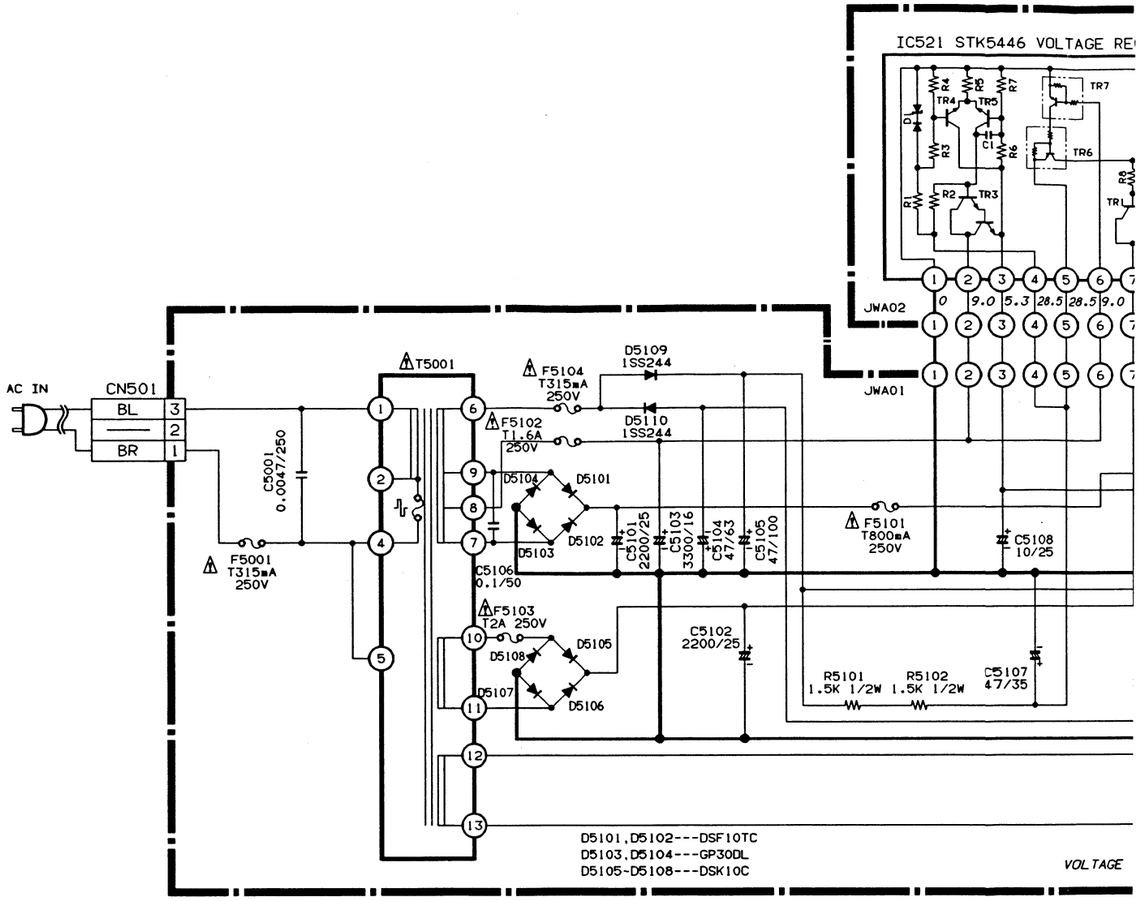

C2009,R2009
27
ATTACK RECOVERY TIME CR
R2010,R2011
29
ALC LEVEL
30
AUDIO OUTPUT (RF MODU)
AUDIO OUTPUT (TB-1)
12
AD MUTE +S.PLAY
R2013,R2012
24
REC LEVEL
14
2
REC H
10
PB H
BDA1-12512/RP1-SPSY


CONV
COMPL AD-A
LO.NO. 2000---
COMPL SV-A
LO.NO. 3500---
IF-PACK
TU-PACK
CN691
TM-8
CN691
CN741
TM4
IC602
IC102
IC161
IC302
IC303
IC304
COMPL SY-A
LO.NO. 3000---
COMPL PW-A
LO.NO. 5400---
1AC4B11A17200D
COMPL VD-A
LO.NO. 1000---
JCI-N1S CP-1

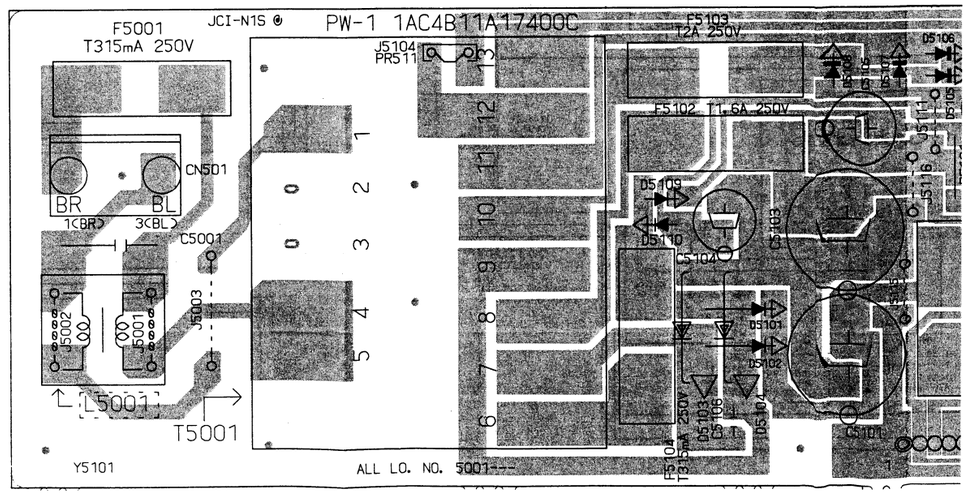
CP-1 BOARD (PW-A) POWER SUPPLY CIRCUIT DIAGRAM



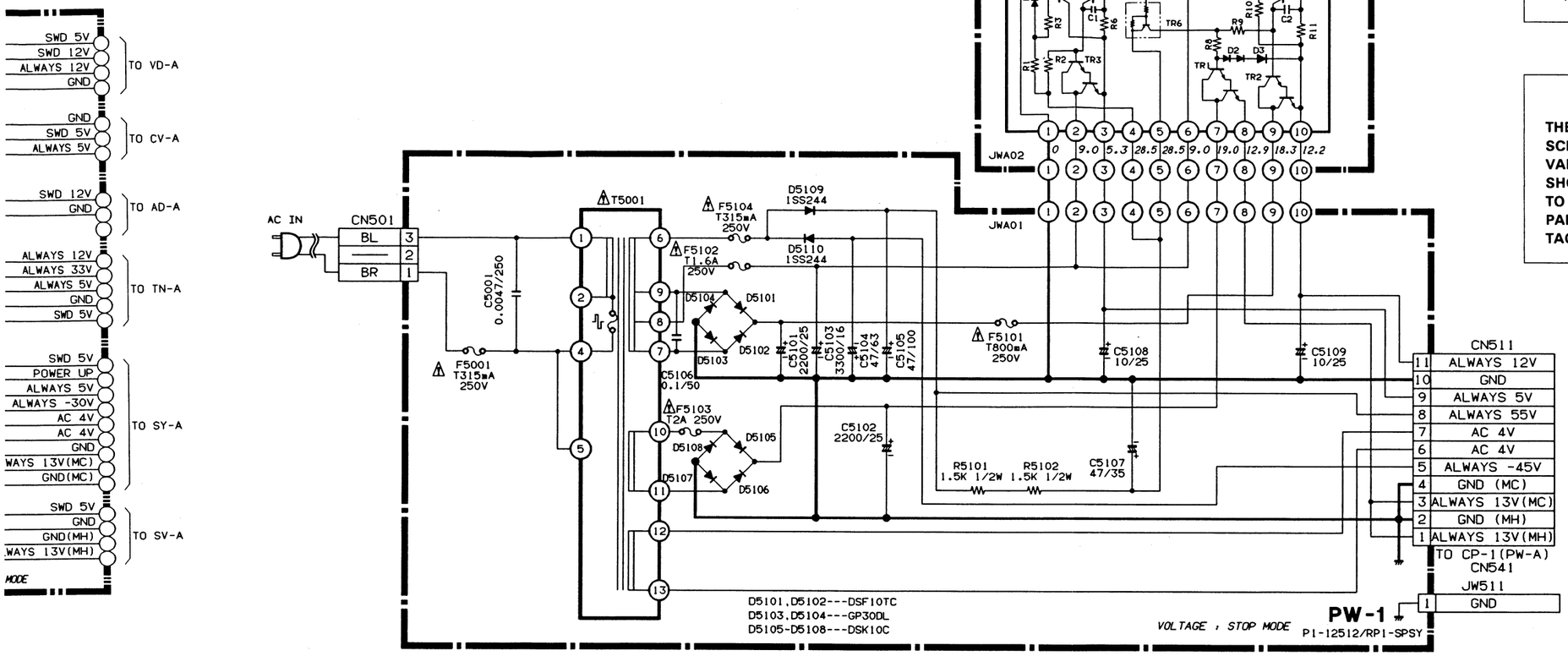
PW-1,2 BOARD POWER SUPPLY CIRCUIT DIAGRAM



PW-1 P.C.B.



PW-1,2 BOARD POWER SUPPLY CIRCUIT DIAGRAM



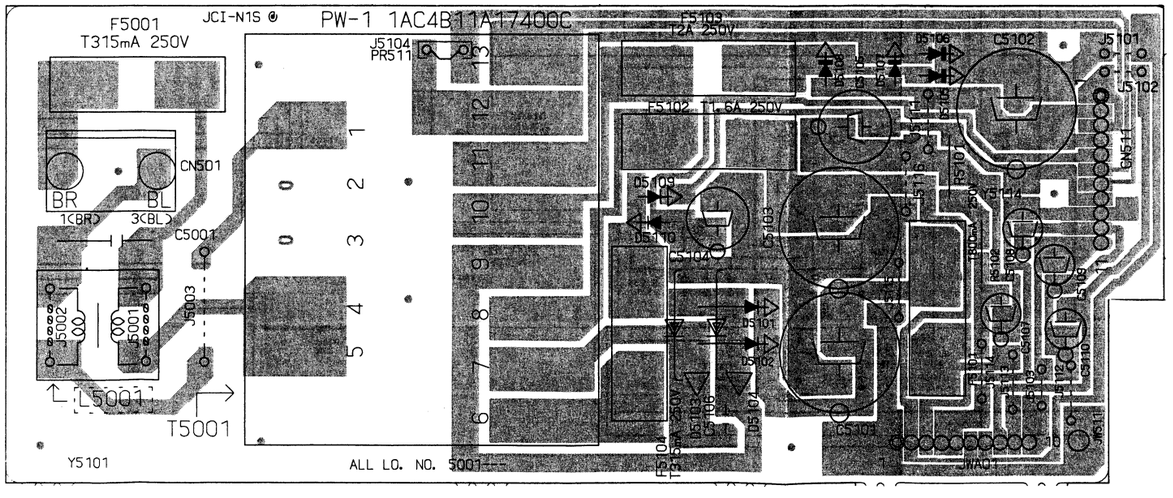
NOTES:

1. All resistance values in "OHMS" unless otherwise noted. (K = 1,000 M = 1,000,000)
2. All capacitance values in "μfd" unless otherwise noted. p = pico farad
3. All inductance values in "mH" unless otherwise noted. μ = micro henry

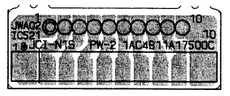
PRODUCT SAFETY NOTICE

THE COMPONENTS DESIGNATED BY A SYMBOL (⚠) IN THIS SCHEMATIC DIAGRAM DESIGNATES COMPONENTS WHOSE VALUE ARE OF SPECIAL SIGNIFICANCE TO PRODUCT SAFETY. SHOULD ANY COMPONENT DESIGNATED BY A SIMBOL NEED TO BE REPLACED, USE ONLY THE PART DESIGNATED IN THE PARTS LIST. DO NOT DEVIATE FROM THE RESISTANCE, WATTAGE AND VOLTAGE RATINGS SHOWN.

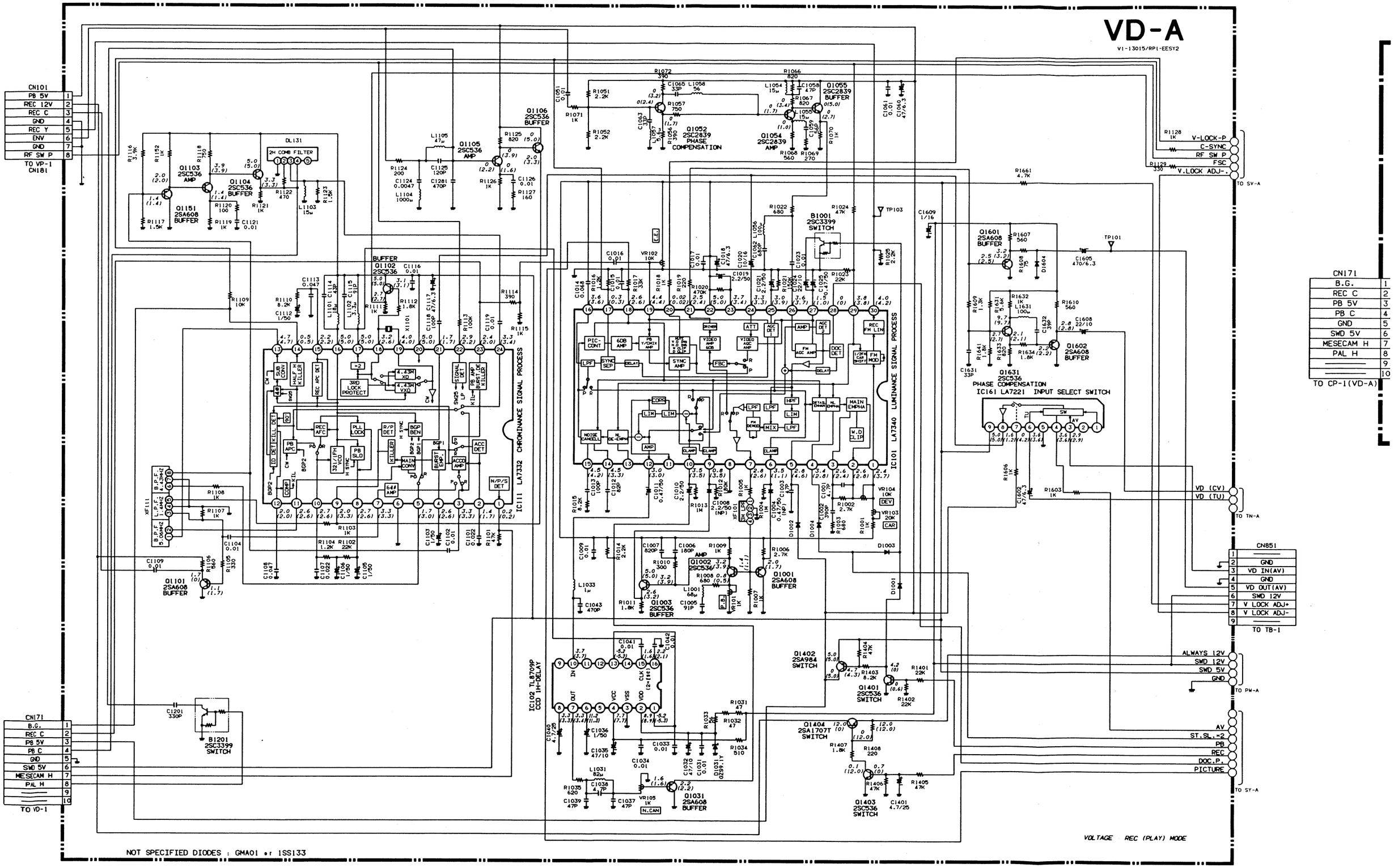
PW-1 P.C.B.



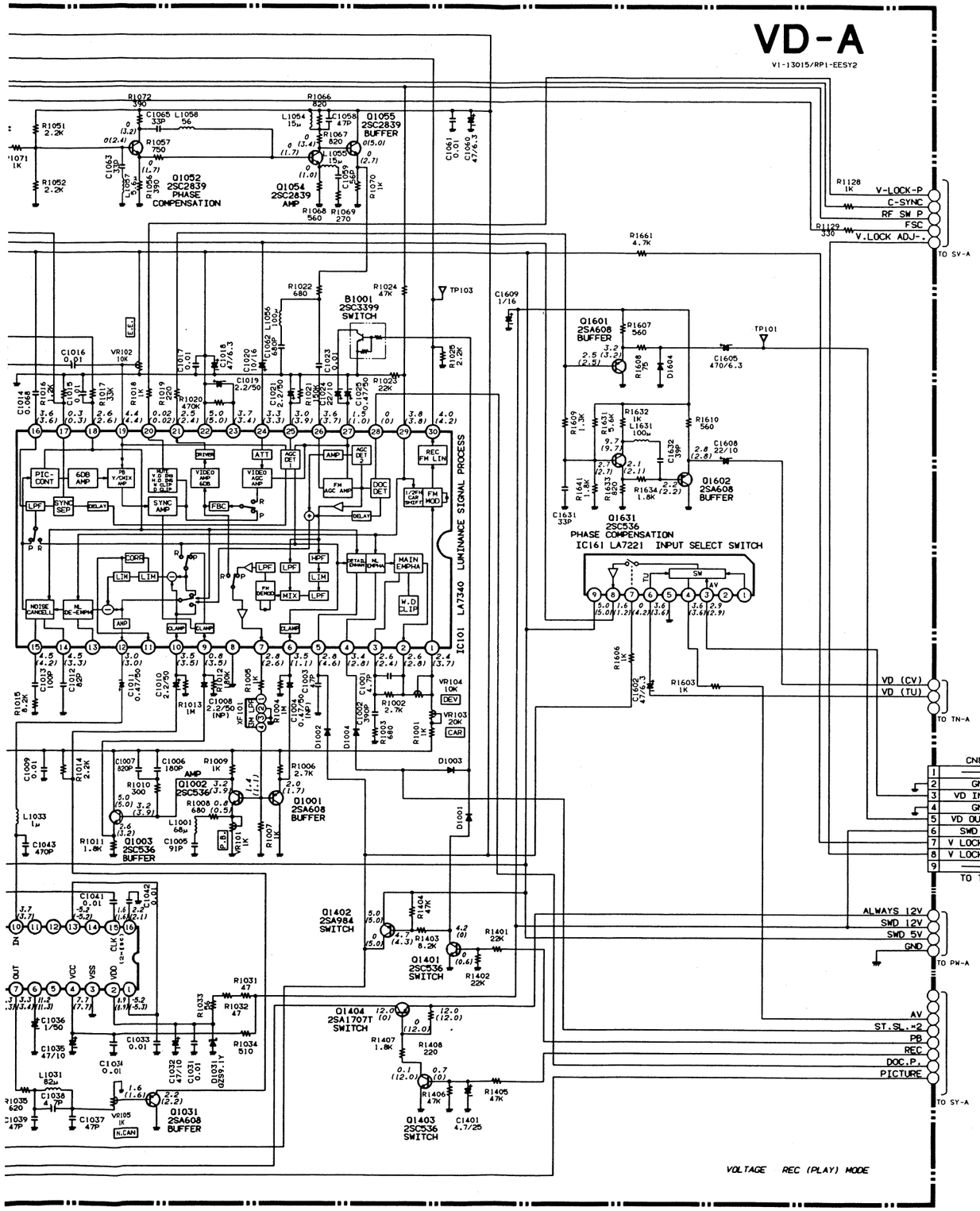
PW-2 P.C.B.



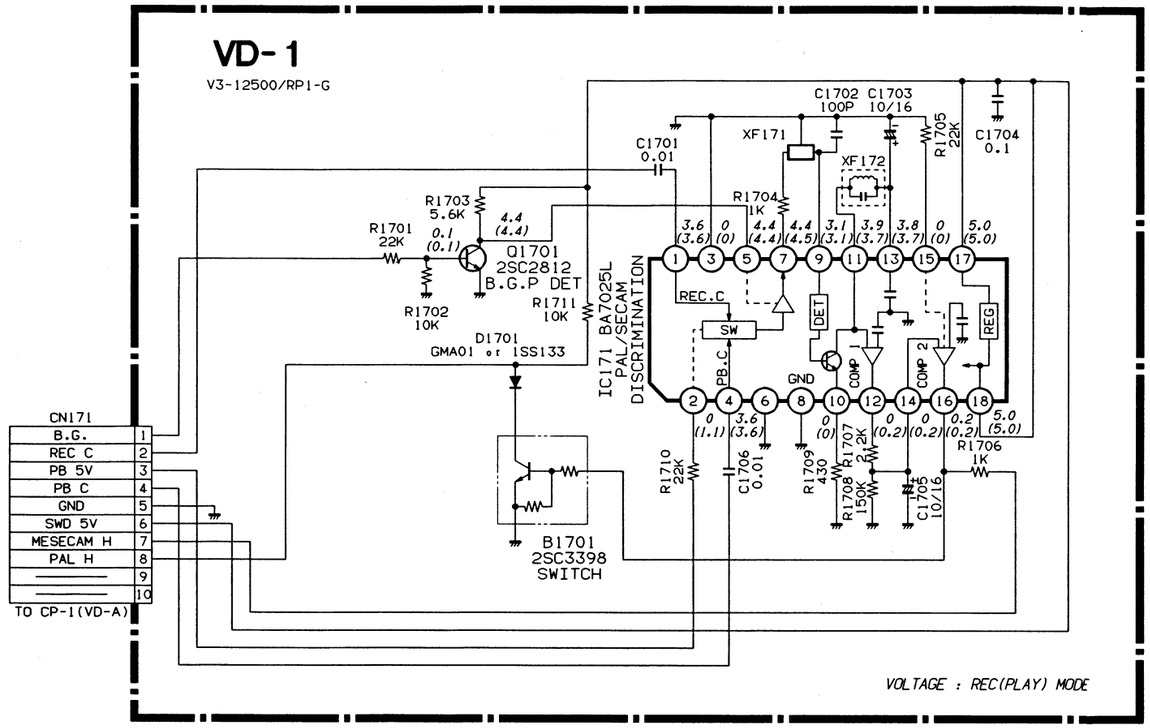
CP-1 BOARD (VD-A) VIDEO CRCUIT DIAGRAM



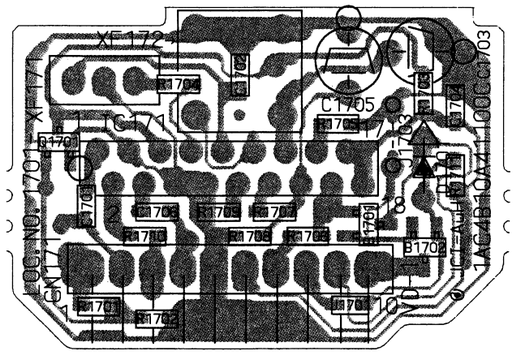
A) VIDEO CRCUIT DIAGRAM



VD-1 BOARD PAL/SECAM DISCRIMINATION CIRCUIT DIAGRAM

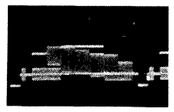
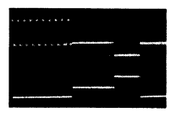
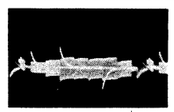
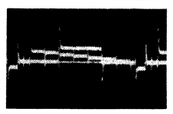
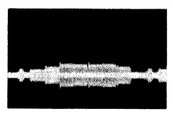
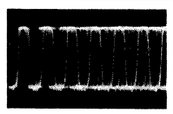
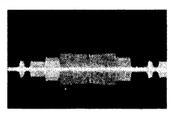
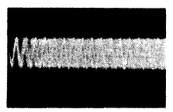
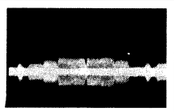
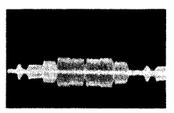
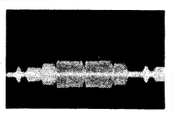
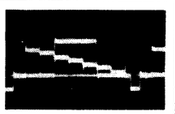
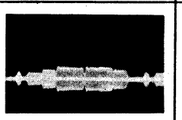
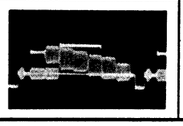
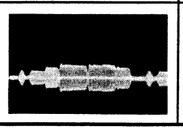


VD-1 P.C.B.

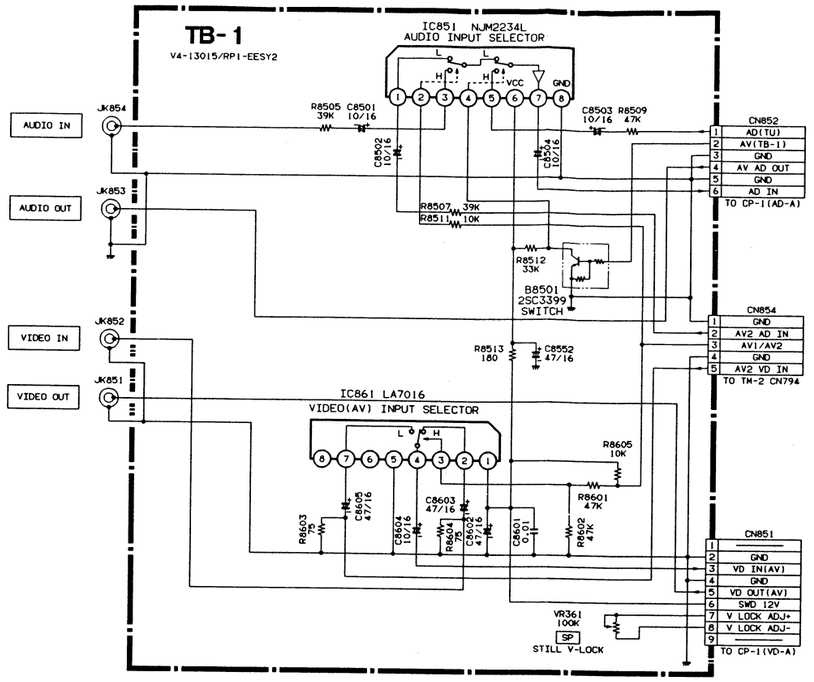


WAVEFORM OF VIDEO

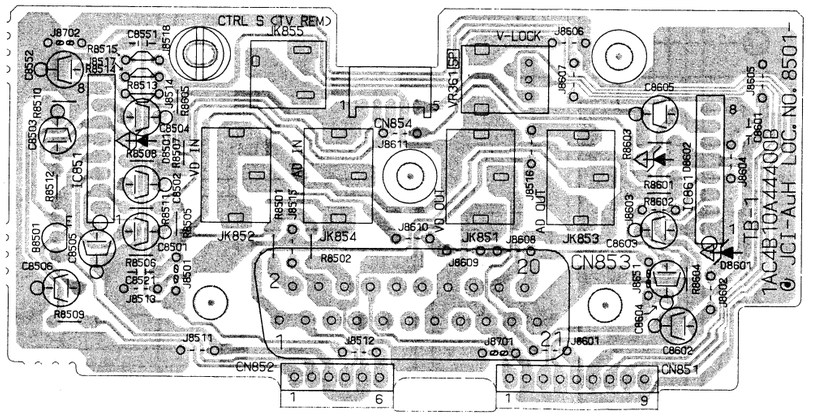
WF-V5

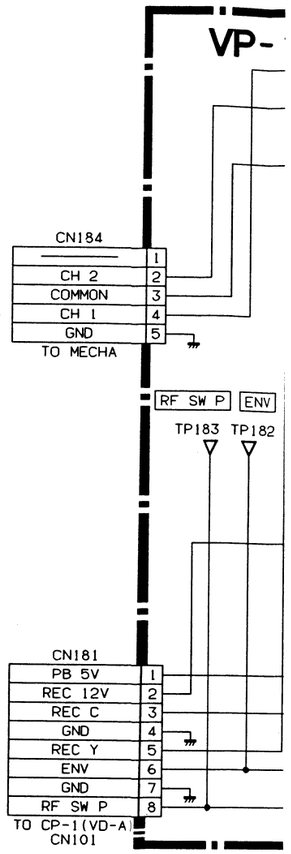
TEST LOCATION	WAVEFORM	MODE/LEVEL	TEST LOCATION	WAVEFORM	MODE/LEVEL
IC101 Pin 24		REC, EE 1 Vp-p	IC101 Pin 21		REC, EE 2 Vp-p
IC101 Pin 7		REC, EE 1 Vp-p	IC101 (UPPER) Pin 21 (LOWER) Pin 20		STILL (UPPER) 2 Vp-p (LOWER) 5 Vp-p
IC101 Pin 6		REC, EE 0.45 Vp-p	IC111 Pin 21		REC, EE 1 Vp-p
IC101 Pin 2		REC, EE 1.3 Vp-p	IC111 Pin 3		REC, EE 0.14 Vp-p
IC101 Pin 30		REC, EE 1.5 Vp-p	IC111 Pin 9		REC, EE 0.8Vp-p
IC101 Pin 26		PB 0.3 Vp-p	Q1105 Base		PB 0.1 Vp-p
IC101 Pin 7		PB 2.0 Vp-p	Q1106 Emitter		PB 0.8 Vp-p
Q1002 Base		PB 0.5 Vp-p	IC111 Pin 7		PB 0.3 Vp-p
IC101 Pin 9		PB 0.6 Vp-p	IC111 Pin 5		PB 1.2 Vp-p
IC101 Pins 10/12		PB 0.5 Vp-p	IC111 Pin 24		PB 0.24 Vp-p
IC101 Pin 21		PB 2 Vp-p	IC111 Pin 23		PB 0.7 Vp-p

TB-1 BOARD VIDEO (AV)/AUDIO INPUT SELECTION CIRCUIT DIAGRAM

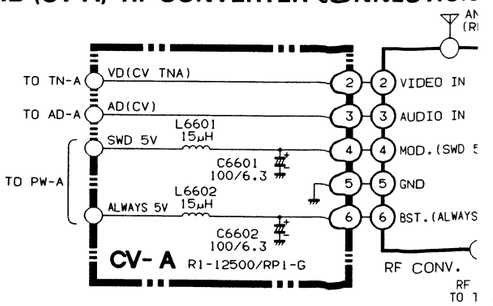


TB-1 P.C.B.





CP-1 BOARD (CV-A) RF CONVERTER CONNECTION



WF-V5

DE/LEVEL

, EE
-p

L
ER)
-p
VER)
-p

, EE
-p

, EE
Vp-p

, EE
p-p

'p-p

'p-p

'p-p

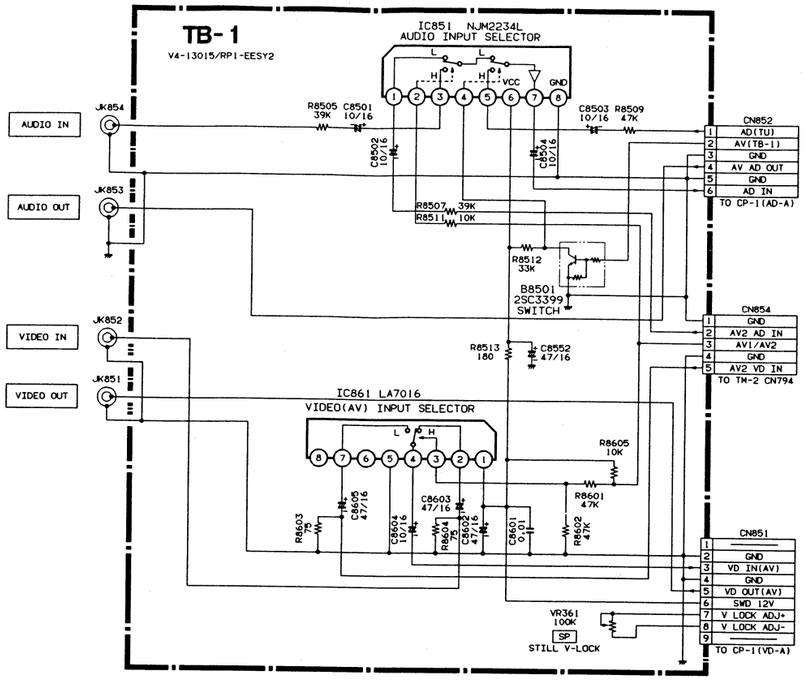
'p-p

'p-p

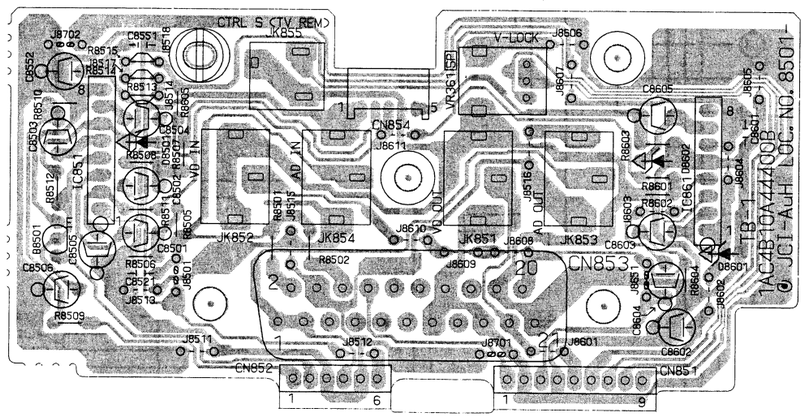
Vp-p

'p-p

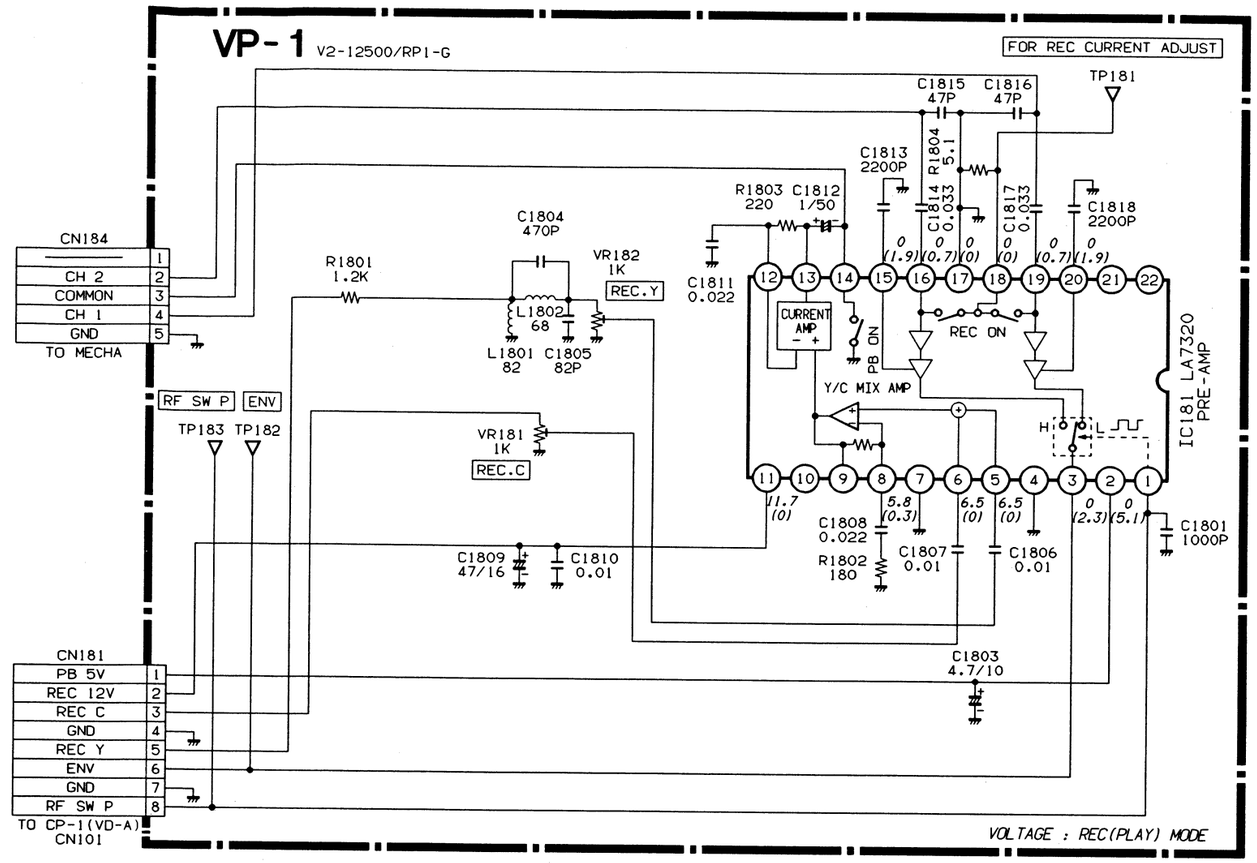
TB-1 BOARD VIDEO (AV)/AUDIO INPUT SELECTION CIRCUIT DIAGRAM



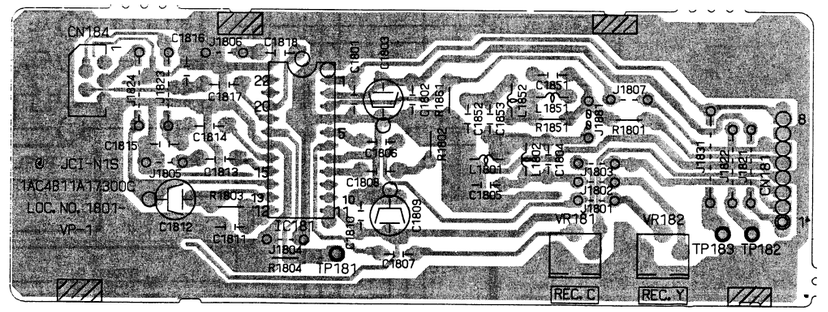
TB-1 P.C.B.



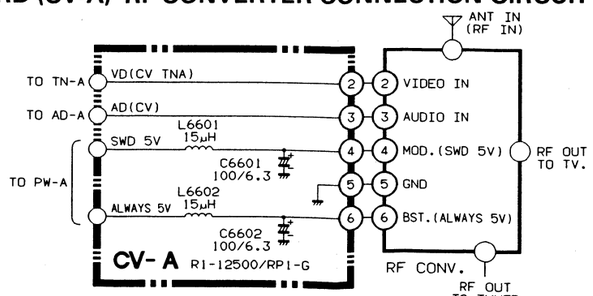
VP-1 BOARD VIDEO PRE-AMP CIRCUIT DIAGRAM



VP-1 P.C.B.

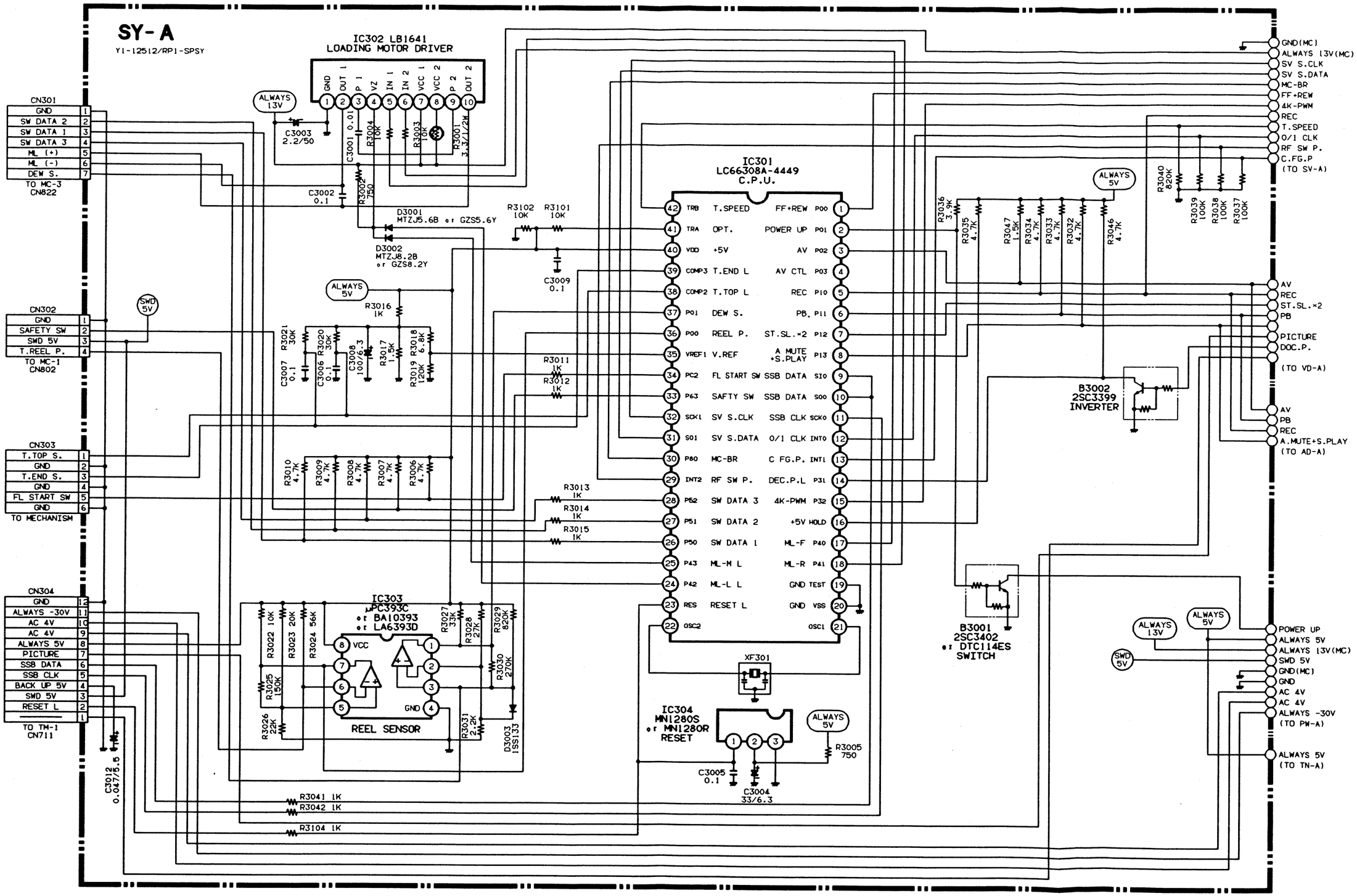


CP-1 BOARD (CV-A) RF CONVERTER CONNECTION CIRCUIT DIAGRAM

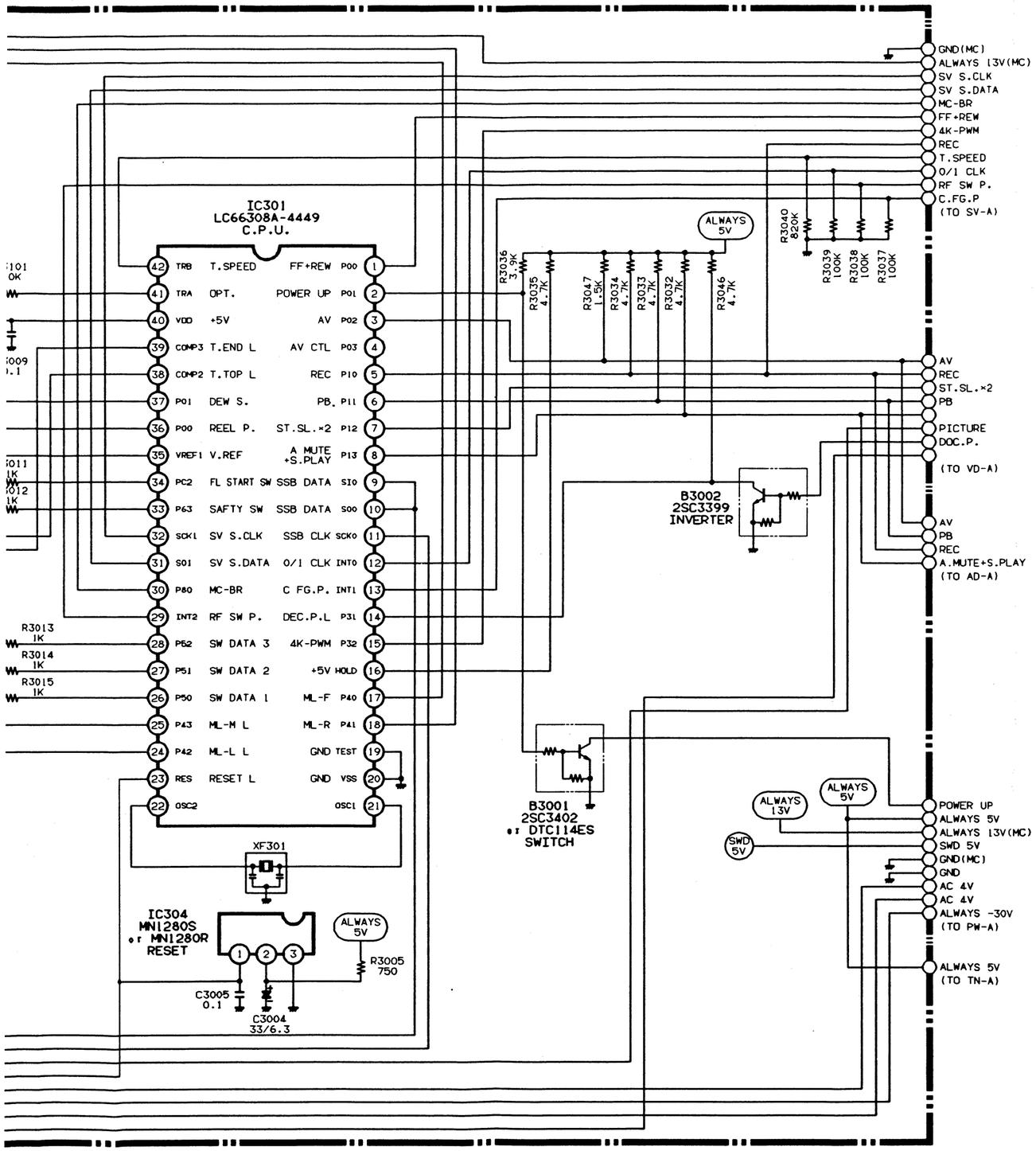


8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

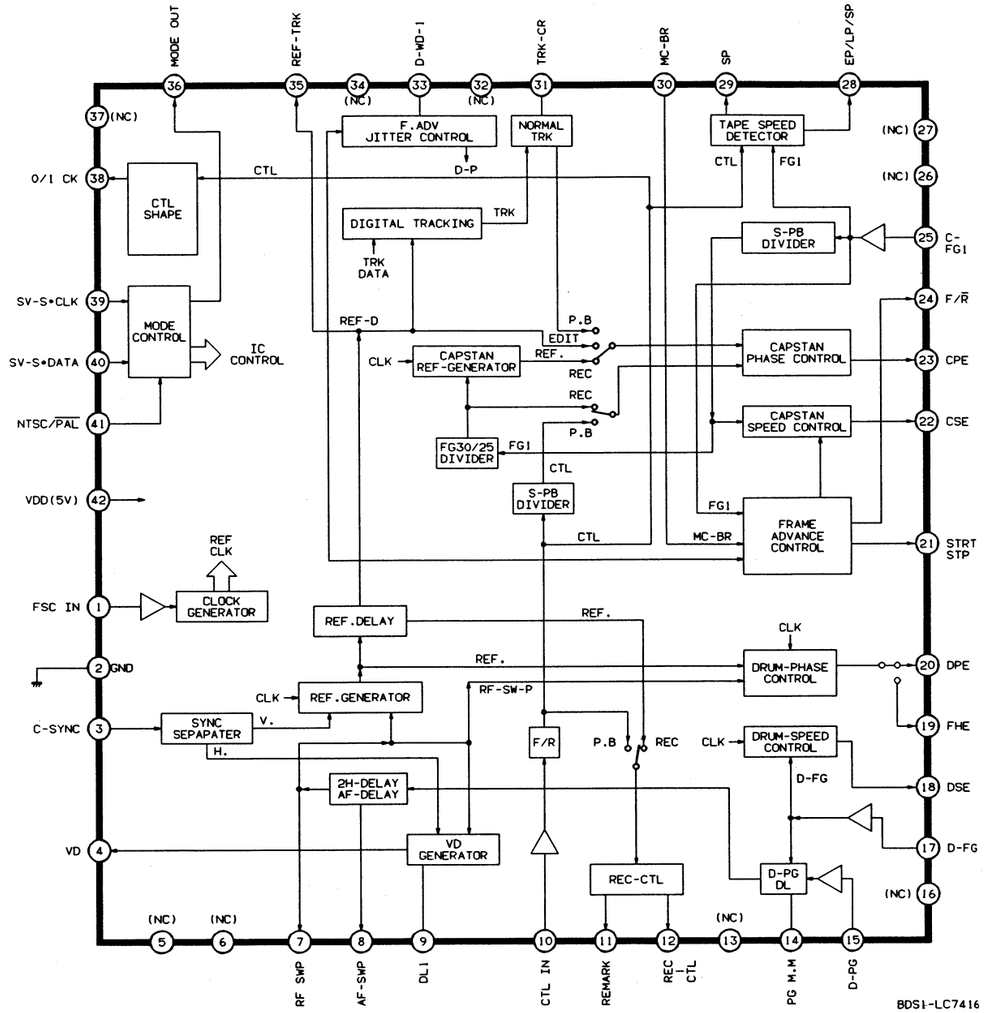
CP-1 BOARD (SY-A) SYSTEM CONTROL CIRCUIT DIAGRAM



ıRD (SY-A) SYSTEM CONTROL CIRCUIT DIAGRAM



IC351 (LC7416) DIGITAL SERVO IC INTER BLOCK DIAGRAM



CP-1 BOARD (SV-A) SERVO CIRCUIT DIAGRAM

SV-A

SI-12500/RP1-PR2

CN353
CTL + 1
CTL - 2
GND 3
TO MC-5 CN841

CN351
DRUM PG 1
GND 2
DRUM FG 3
ALWAYS 13V(MH) 4
DRUM VS 5
GND(MH) 6
TO MECHANISM

CN352
F/R 1
CAP VS 2
— 3
GND 4
CAP FG1 5
SWD 5V 6
ALWAYS 13V(MC) 7
GND(MC) 8
TO MECHANISM

ALWAYS 13V(MH)
GND(MH)
SWD 5V
GND
TO PW-A
V.LOCK ADJ
FSC
C-SYNC
V-LOCK-P
RF SW P
TO VD-A

REC
O/I CLK
FF+REW
MC-BR
SV S.DATA
SV S.CLK
RF SW P.
T.SPEED
C.FG.P.
4K-PWM
ALWAYS 13V(MC)
GND(MC)
TO SY-A

IC352 LA7123 AMP
GND1 GND2 S/S VCC2 VCC1
AGC DET
REC AMP
TRAP
SW LOGIC
THRESH SELECT
CTL SHAPE
PG AMP SHAPE
DFG AMP SHAPE
FG
CAP
CYL.

IC351 LC7416-8080 SERVO M.P.U
Fsc Vss C-Sync Vd-OUT (NC) (NC) RF SW AF SW DL CTL IN REMARK REC-CTL (NC) DPG-MM DPG (NC) DFG DSE FHE DPE C-STRT/STP
Vdd NTSC/PAL SV-DATA SV-CLK O/I-CK (NC) MODE-OUT REF-TRK (NC) D-WDI (NC) TRK-CR CAP-BRK SP-OUT EP/LP/SP (NC) (NC) CFGI F/R-OUT CPE CSE

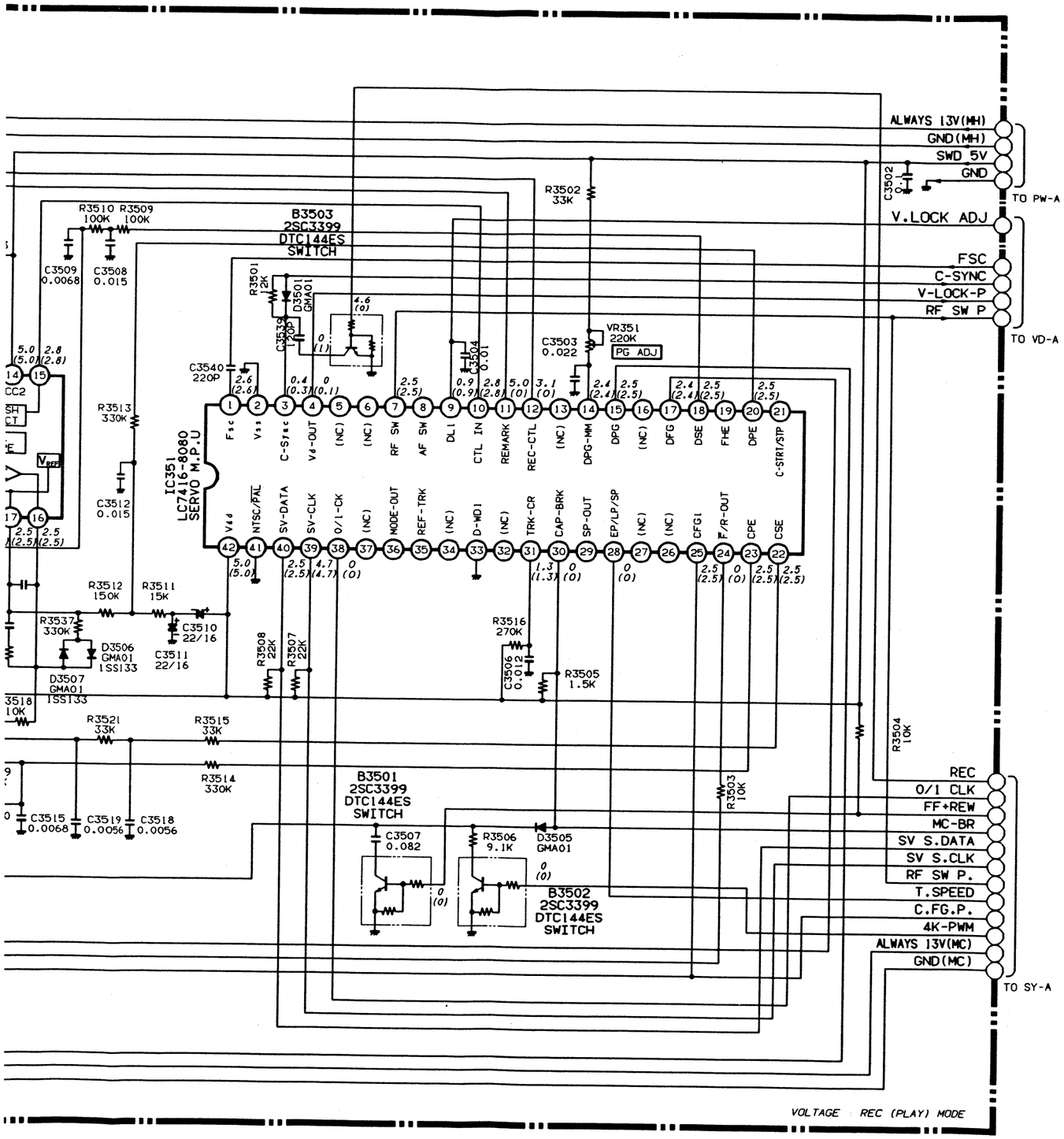
B3503 2SC3399 DTC144ES SWITCH
B3501 2SC3399 DTC144ES SWITCH
B3502 2SC3399 DTC144ES SWITCH

VR351 220K PG ADJ

D3501 GMA01
D3502 GMA01 1SS133
D3503 GMA01 1SS133
D3504 GMA01 1SS133
D3505 GMA01
D3506 GMA01 1SS133
D3507 GMA01 1SS133

VOLTAGE REC (PLAY) MODE

CP-1 BOARD (SV-A) SERVO CIRCUIT DIAGRAM



WAVEFORM OF SERVO

IC351 (LC7416)

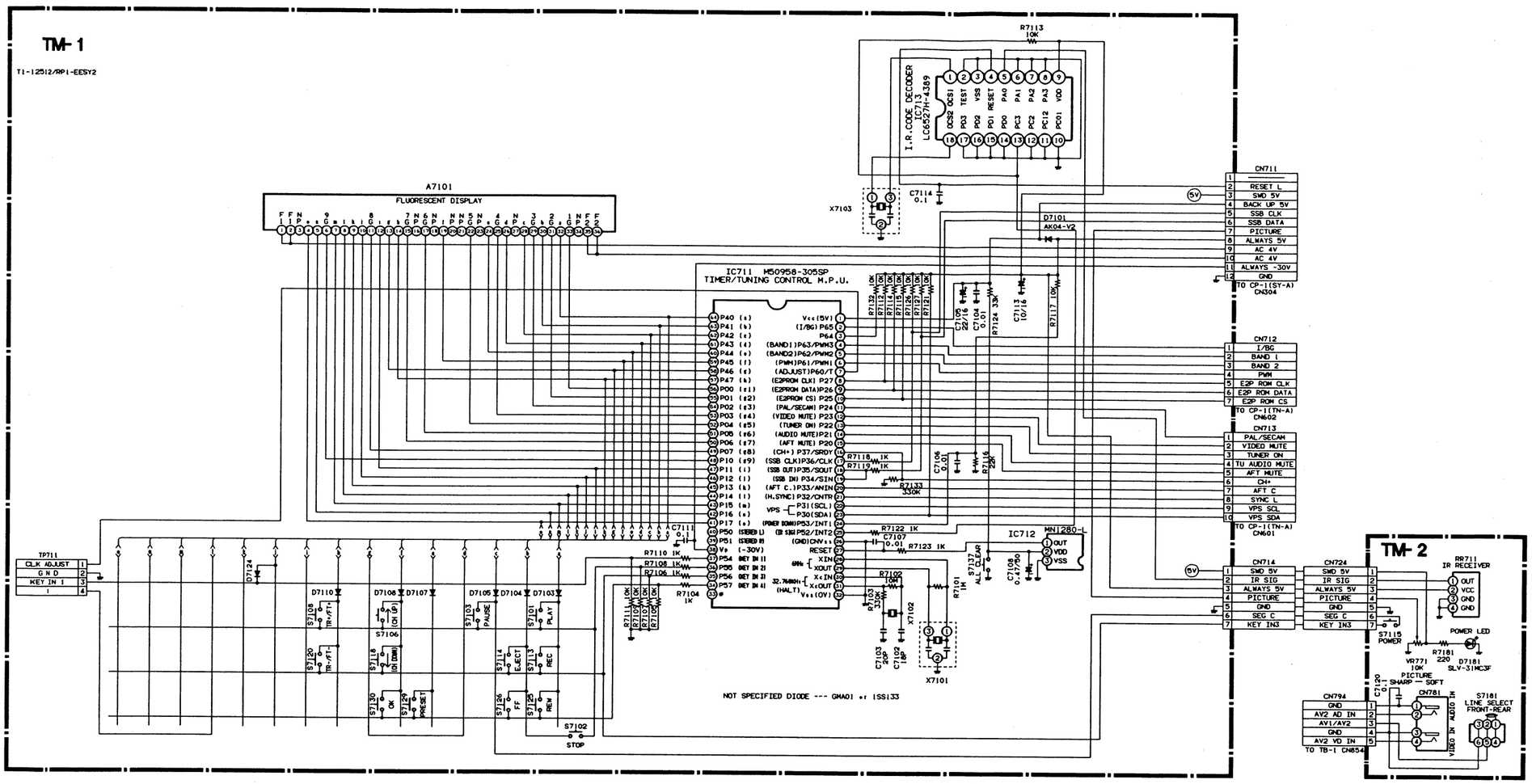
⑦	4.9V, 20msec 20msec	㉕	4 V, 2 msec = 504Hz
⑧	5V, 20msec 20msec	㉛	3 msec, 3 V, 40 msec
⑨	0.4 msec, 3V, 20 msec	㊳	17 μsec, 5 V, 40 msec
⑩	REC, 3.8V, 24 msec 16 msec	①	1Vp-p, 4.43 MHz
	P.B., 3.9 V, 24 msec 16 msec	③	3.7 V, T = 20 msec
⑫	REC, 5 V, 24 msec 16 msec	③	P.B., 40 mV, 40 msec
⑭	2.1 msec, 3 V, 20 msec	④	P.B., 1.2 Vp-p
⑮	3.9 V, 40 msec	⑦ ⑧	REC, 3.2 V, 24 msec 16 msec
⑰	4 V, 1.33 msec = 750 Hz	⑫	5 V, 24 msec 16 msec
⑱ ⑳ ㉒ ㉓	5 V, 8.593 kHz		

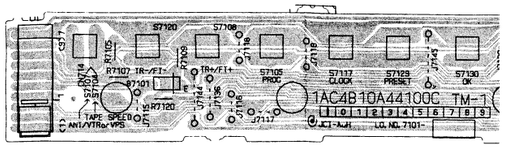
IC352 (LA7123)

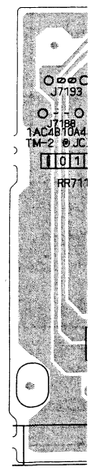
⑮	REC, 3.8 V, 24 msec 16 msec
	P.B., 3.9 V, 24 msec 16 msec
㉔ ㉖	1.2 Vp-p, 2 msec = 504 Hz
㉓	4 V, 2 msec = 504 Hz
㉗	4 V, 1.33 msec = 750 Hz
㉘	10 mVp-p, 1.33 msec
㉙	150 mVp-p, 40 msec
㉚	3.9 V, 40 msec

WF-S1

TM-1 BOARD DISPLAY, TIMER & TUNING CONTROL CIRCUIT DIAGRAM
TM-2 BOARD SWITCH & VR CIRCUIT DIAGRAM



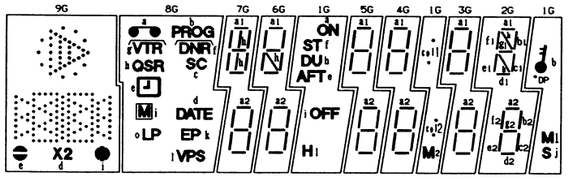




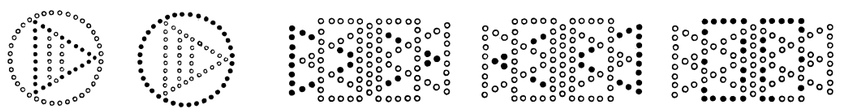
ANODE CONNECTION

	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	B	●●	a1	a1	a1	a1	a1	a1	ON
b	A	PROG.	b1	b1	b1	b1	b1	b1	♪
c	–	SC	c1	c1	c1	c1	c1	c1	DP
d	×2	DATE	d1	d1	d1	d1	d1	d1	M(1)
e	⇔	◪	e1	e1	e1	e1	e1	e1	AFT
f	C	DNR	f1	f1	f1	f1	f1	f1	ST
g	D	VTR	g1	g1	g1	g1	g1	g1	DU
h	–	QSR	／	＼	–	–	–	＼	DU
i	●	▣	a2	a2	a2	a2	a2	a2	OFF
j	E	–	b2	b2	b2	b2	b2	b2	S
k	I	EP	c2	c2	c2	c2	c2	c2	–
l	H	VPS	d2	d2	d2	d2	d2	d2	H
m	J	–	e2	e2	e2	e2	e2	e2	M(2)
n	F	–	f2	f2	f2	f2	f2	f2	–
o	G	LP	g2	g2	g2	g2	g2	g2	DU

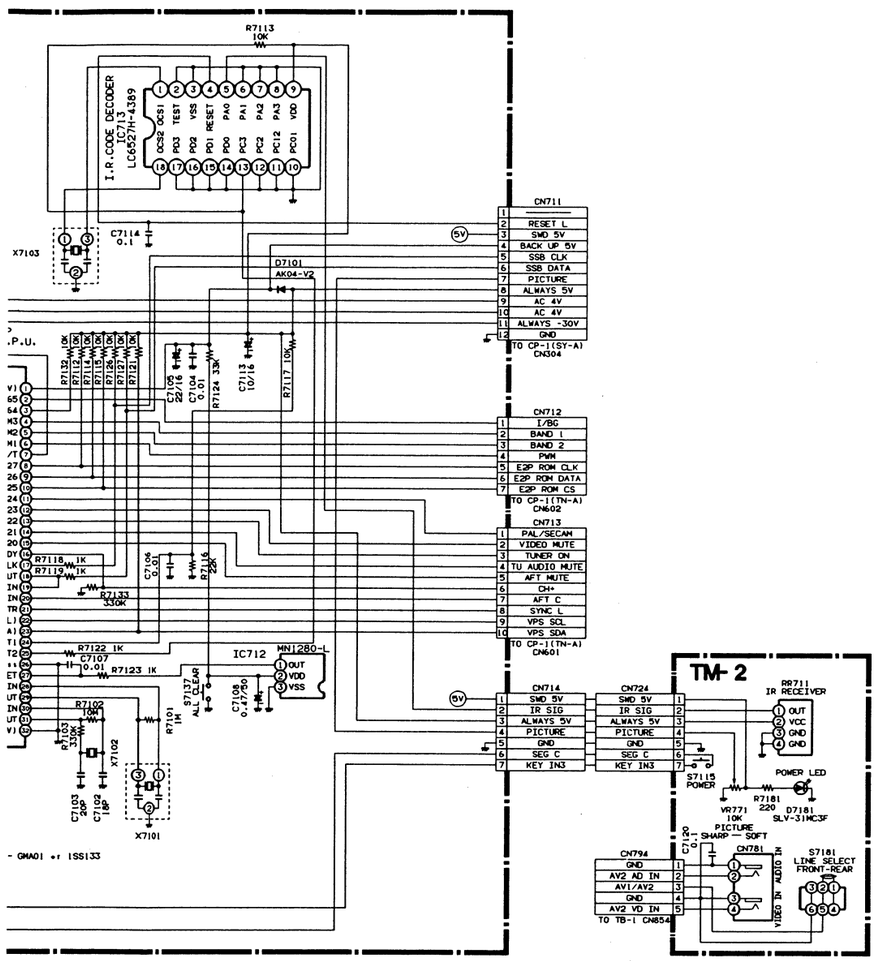
GRID ASSIGNMENT



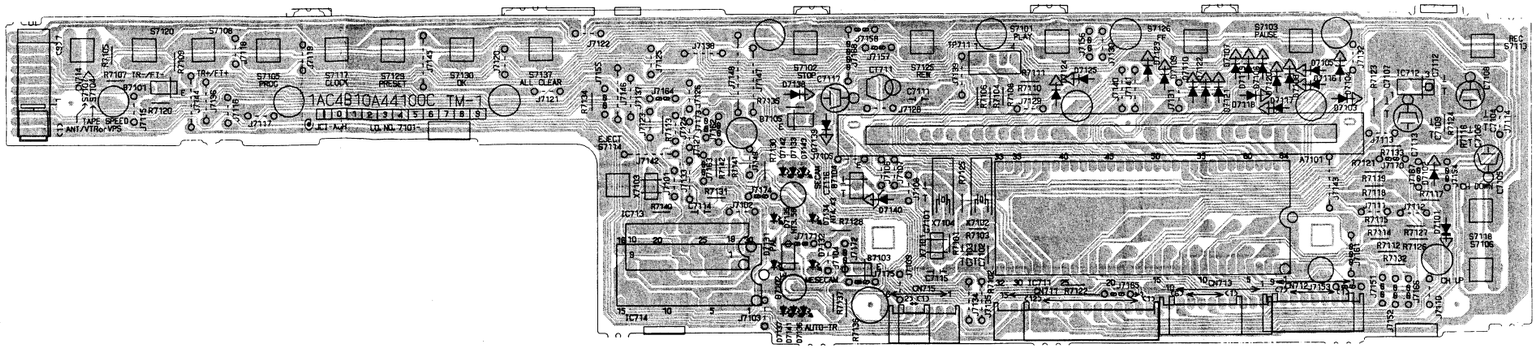
9G: GRAPHIC MODE DISPLAY



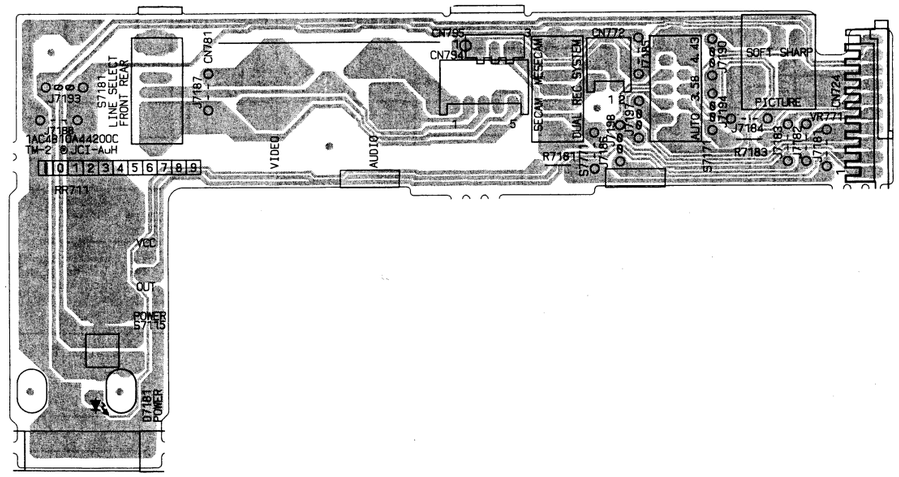
L CIRCUIT DIAGRAM



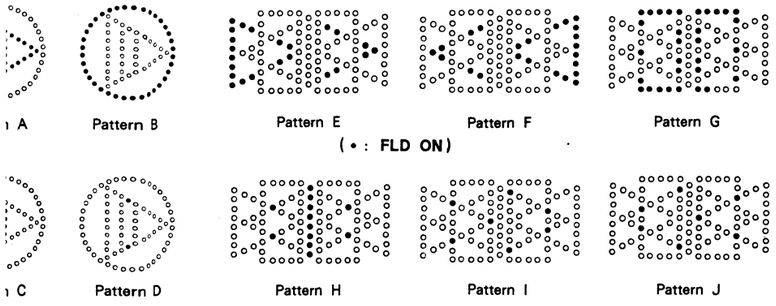
TM-1 P.C.B.



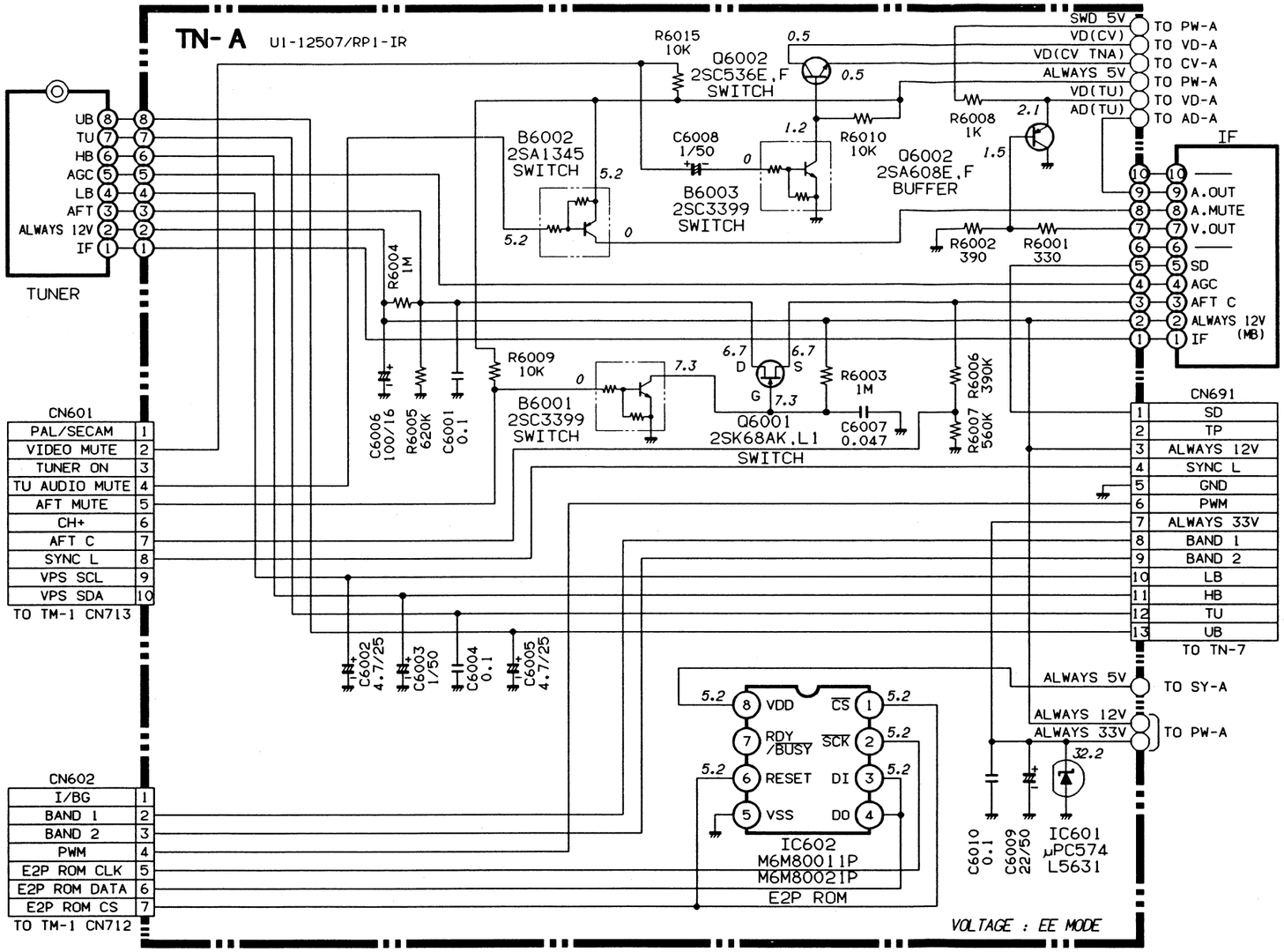
TM-2 P.C.B.



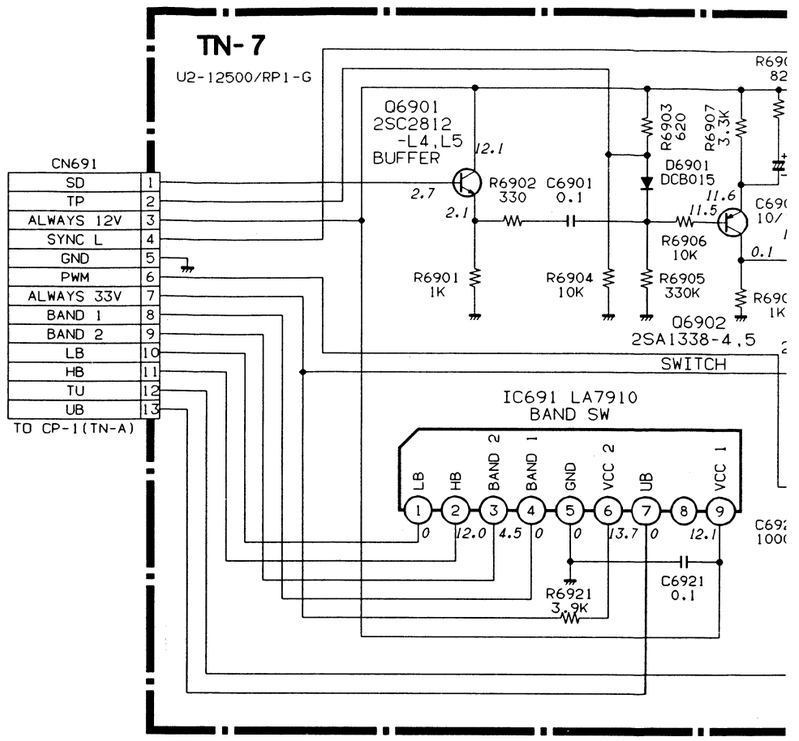
APHIC MODE DISPLAY



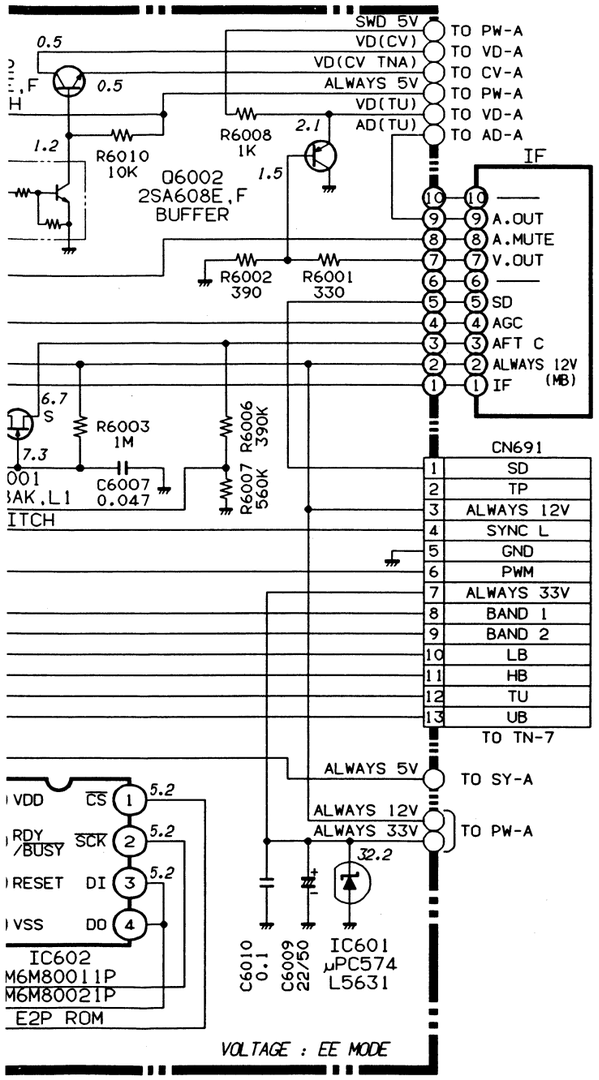
CP-1 BOARD (TN-A) TUNER IF CONNECTION CIRCUIT DIAGRAM



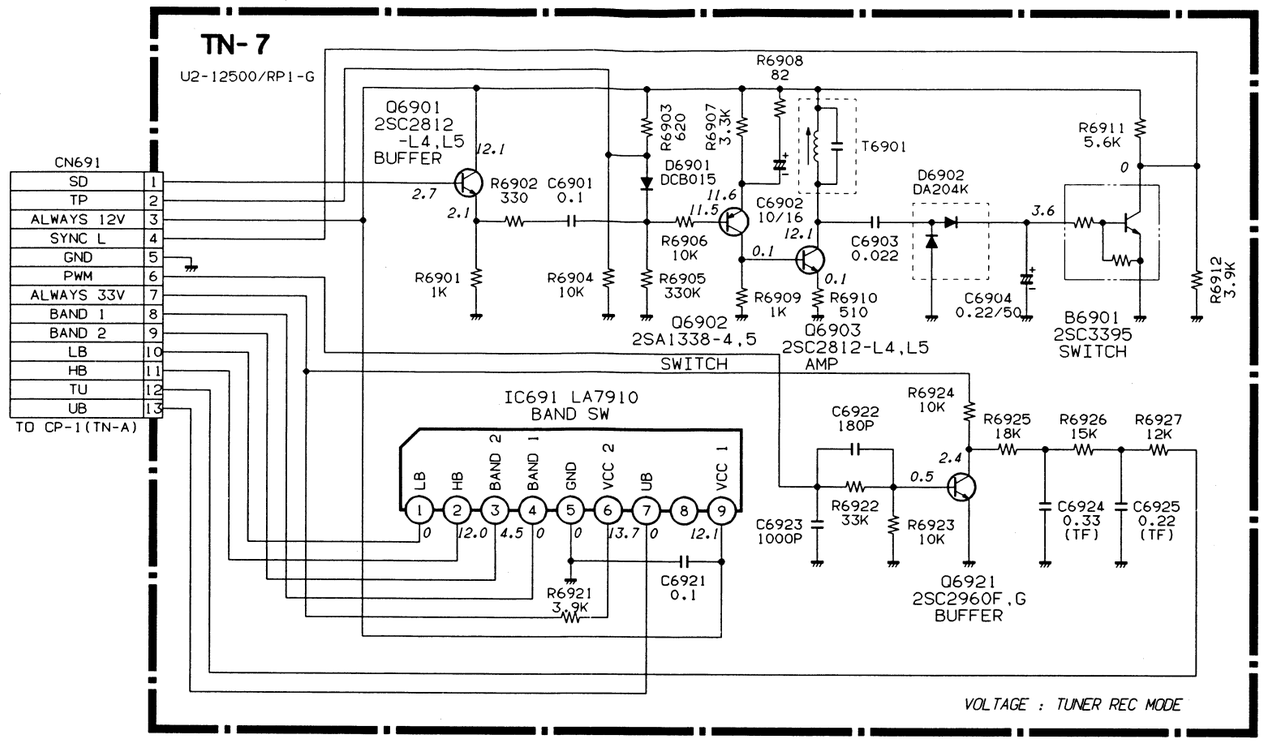
TN-7 BOARD TUNING DET. & SYNC DE



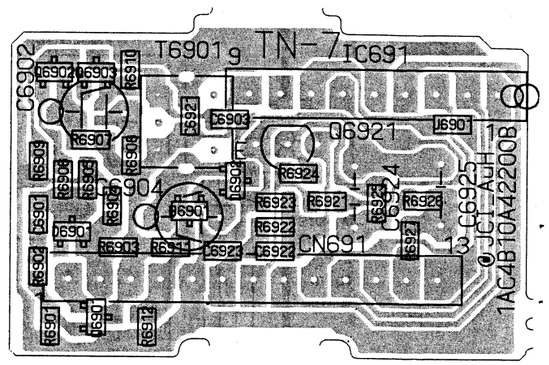
ON CIRCUIT DIAGRAM



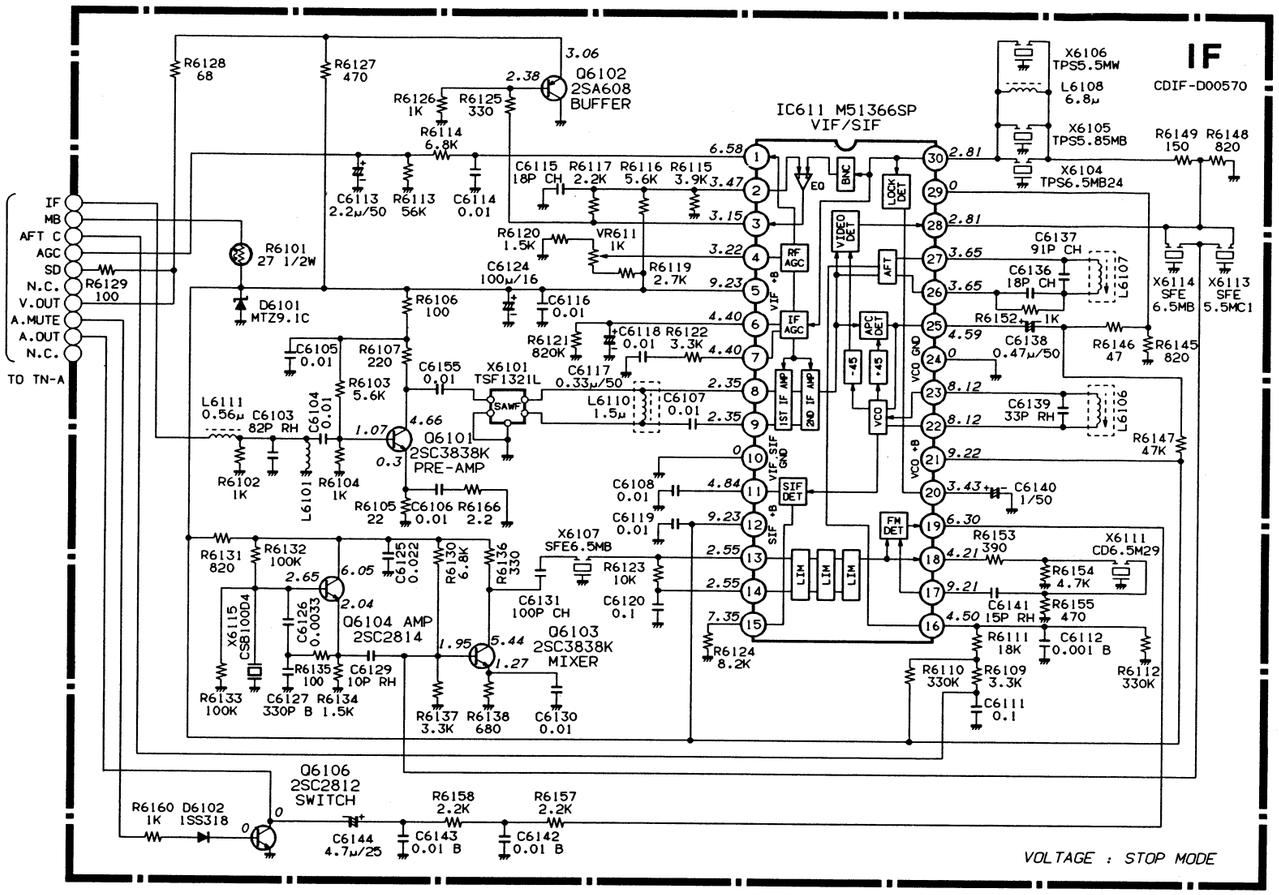
TN-7 BOARD TUNING DET. & SYNC DET. CIRCUIT DIAGRAM

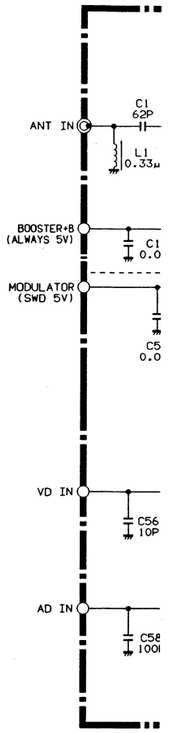


TN-7 P.C.B.

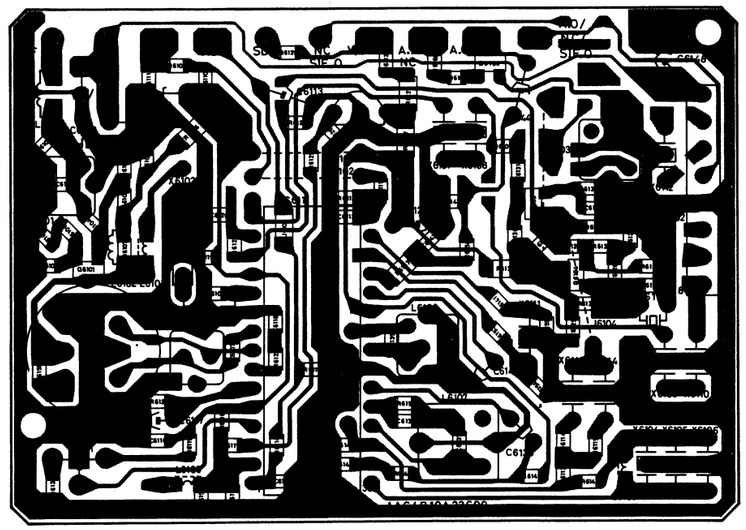


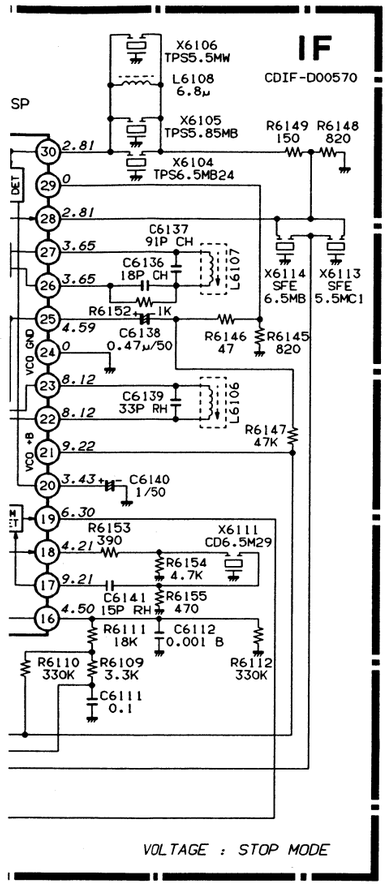
IF CIRCUIT DIAGRAM



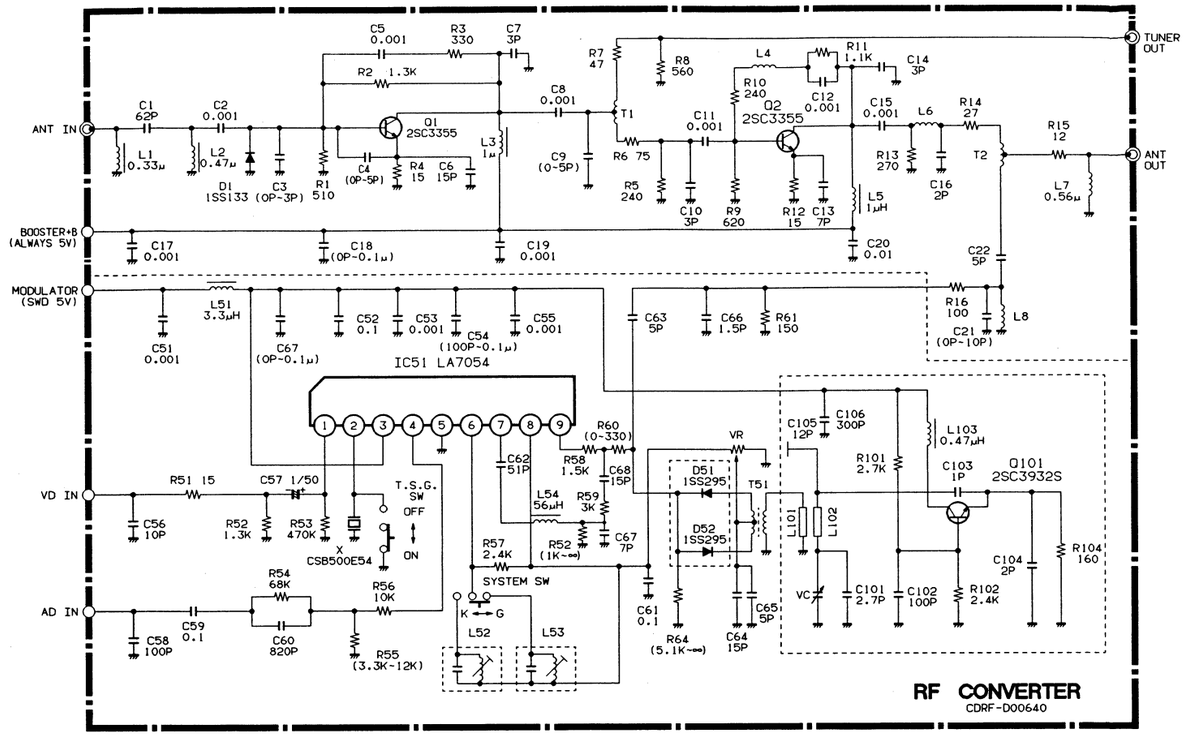


IF P.C.B.

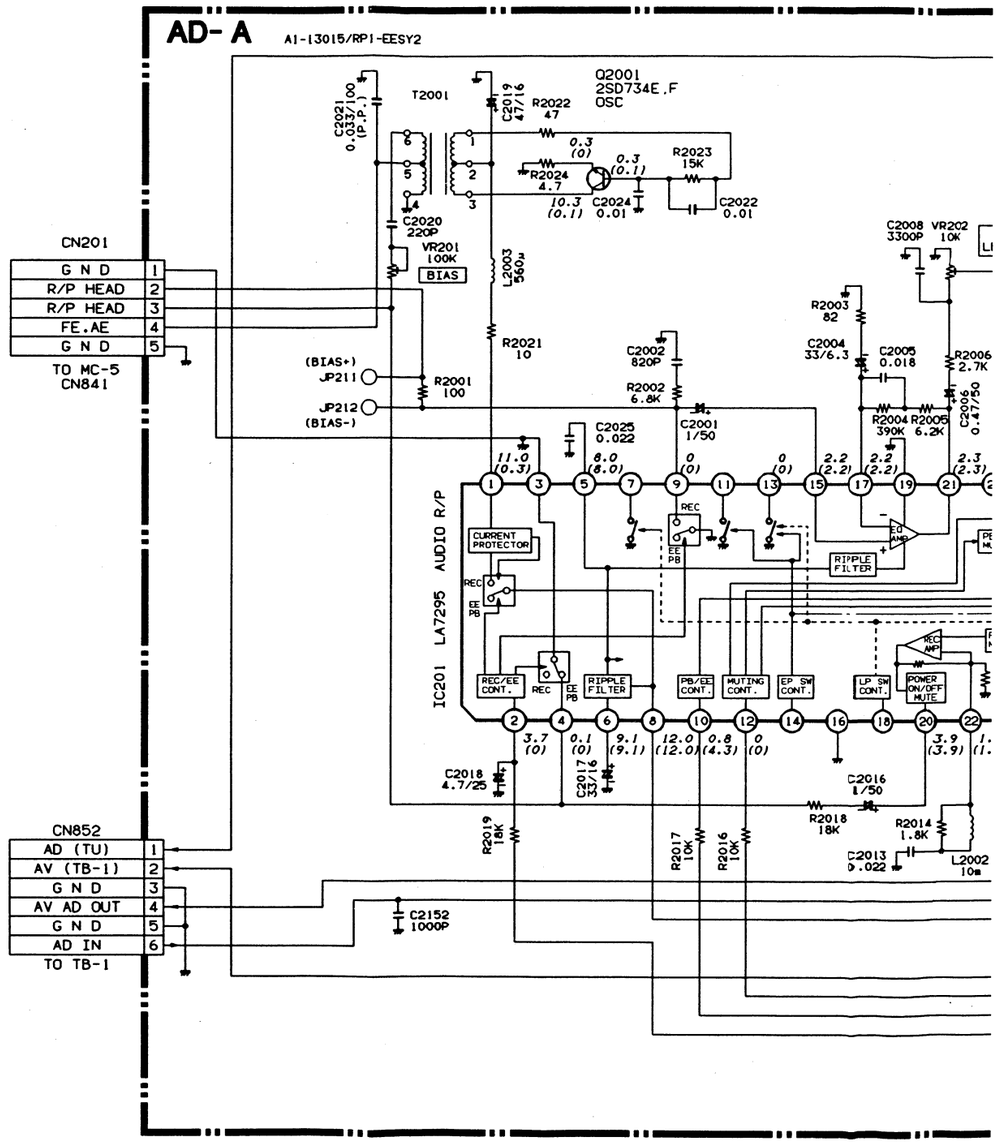




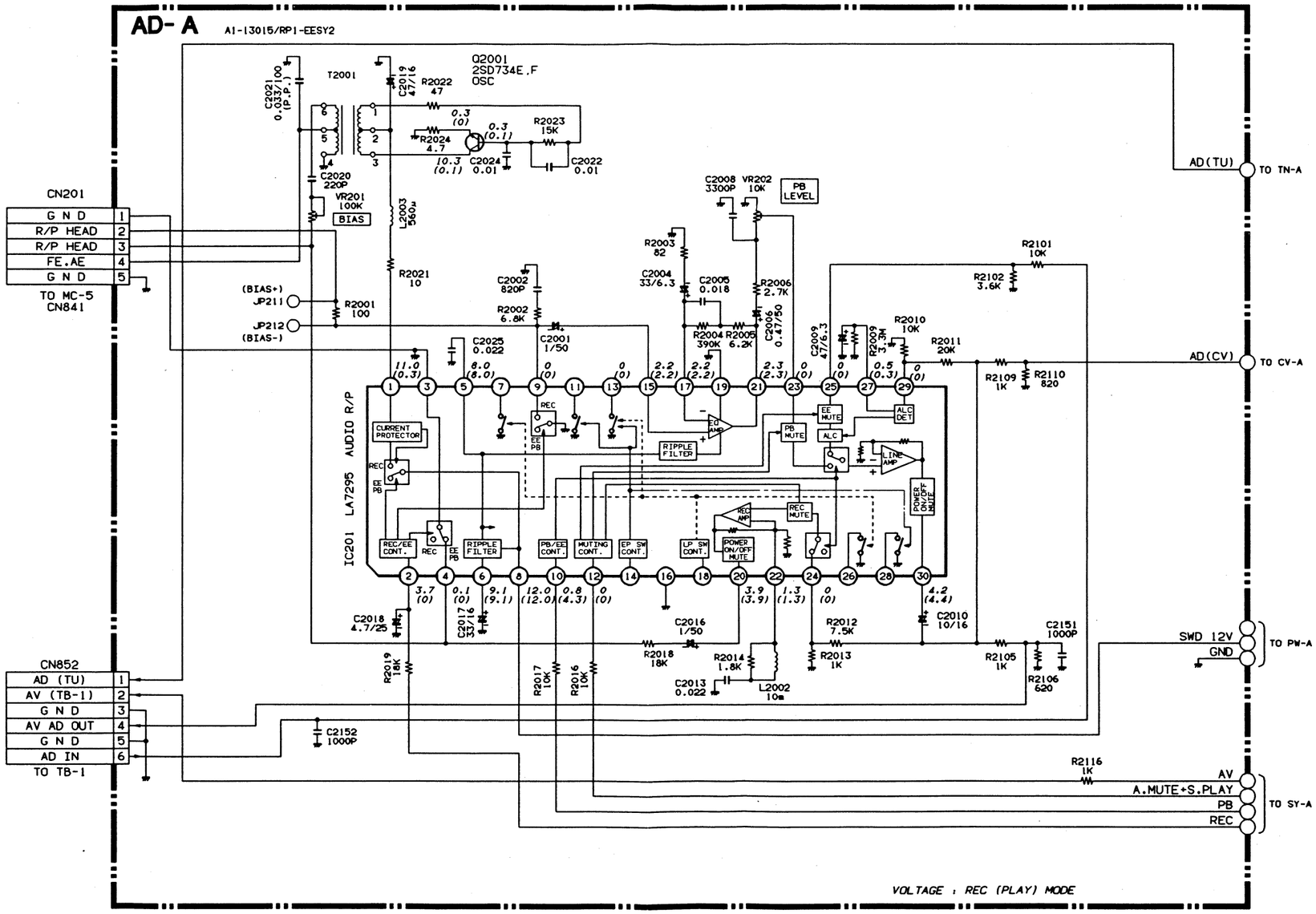
RF CONVERTER CIRCUIT DIAGRAM



CP-1 BOARD (AD-A) AUDIO CIRCUIT



CP-1 BOARD (AD-A) AUDIO CIRCUIT DIAGRAM



IC301 (LC66308A) SYSTEM CONTROL MPU PIN FUNCTIONS TABLE

NO.	Name	I/O	I/O Signal Function
1	FF + REW	O	Output during FF/REW.
2	POWER UP	O	Output when the power is ON. POWER ON : H
3	INPUT SELECT	O	Output when selecting an EE external input.
4	AV CTL or ANT/VTR	O O	The same as the signal (PB H) for 8-pin Euro connector for selection of a RF converter output. Option by Pin 41.
5	REC H	O	REC indication signal. REC : H
6	PB H	O	PB image output indication signal. PB image : H
7	STILL + F.ADV	O	Broaden the H DOC pulse width during still frame advance.
8	A MUTE	O	Audio output inhibit indication signal. MUTE : H
9	$\overline{\text{SSB DATA}}$	I	For communications with the timer microprocessor. 8 bit × 12 block serial data.
10		O	
11	$\overline{\text{SSB CLK}}$	O	Clock pulse for SSB.
12	CTL PULSE	I	Approx. 25 Hz during REC/PB. Pulse for linear time counter. For discrimination of audio output mute while playing back the non-recorded portion.
13	$\overline{\text{CAP. FG PULSE}}$	I	Capstan FG signal. While checking the pulse width of this signal, the brake is applied to the capstan motor.
14	DOC PULSE	I	Noise feeding during STILL (PAUSE).
15	4K PWM	O	Outputs a 4 kHz PWM signal for approx. twelve seconds at the start of FF/REW to gradually start the tape running speed.
16	HOLD	I	+ 5V
17	ML F	O	For indicating the loading in FWD direction.
18	ML R	O	For indicating the loading in RVS direction.
19	TEST		GND
20	Vss		GND
21	OSC1		Clock oscillator (clock frequency of 4 MHz).
22	OSC2		
23	$\overline{\text{RESET}}$	I	Initial reset
24	$\overline{\text{ML L}}$	O	Loading motor low-speed indication signal
25	$\overline{\text{ML M}}$	O	Loading motor medium-speed indication signal
26	$\overline{\text{SW DATA 1}}$	I	Mechanical position switch
27	$\overline{\text{SW DATA 2}}$		
28	$\overline{\text{SW DATA 3}}$		
29	$\overline{\text{RF SE PULS}}$	I	25 Hz drum rotation detection during REC/PB. Takes timing during still noise feeding.
30	Mc BR	O	Capstan motor accelerating/decelerating signal Capstan motor brake Noise feeding during STILL
31	$\overline{\text{SV S DATA}}$	O	Serial data to servo microprocessor
32	$\overline{\text{SV S CLK}}$	O	Clock to the servo microprocessor
33	SAFTY SW	I	Erase prevention switch signal. With tab : L Without tab : H
34	FL START SW	I	Front loading (cassette loading) SW
35	V_REF	I	Reference voltage for internal comparator (for TAPE TOP S, TAPE END S ports)
36	REEL PULS	I	Reel table rotation detection
37	DEW SENSOR	I	Dew detection DEW : H
38	TAPE TOP S.	I	Tape winding start detection
39	TAPE END S.	I	Tape winding end detection
40	Vdd		5V
41	OPTION	I	For Pin 4 output selection 5V : AV CTL 2.5V : ANT/$\overline{\text{VTR}}$
42	TAPE SPEED	I	Tape speed discriminating data during PB (SP : LOW LP : HIGH)

P66308-0

IC351 (LC7416) DIGITAL SERVO IC PIN FUNCTIONS TABLE

Pin No.	I/O Terminal Name	I/O	Input/Output Function
1	FSC IN	I	Input for the IC internal system clock pulse. A level of at least 0.3 Vp-p is required. The color subcarrier signal is input by capacitive coupling.
2	Vss		Ground
3	C-SYNC	I	Composite sync signal input.
4	VD	O	Dummy VD signal output.
5	NC	—	NC
6	NC	—	
7	RF-SW-PULSE	O	Video head switching pulse output.
8	AF-SW-PULSE	O	Audio head (FM) switching pulse output.
9	DL1	I	Dummy VD insertion position control CR.
10	CTL-IN	I	Control signal input.
11	REMAK	O	Outputs the control signal re-recording control signal. Three-value output (H, M, L).
12	REC-CTL	O	Recording control signal output. Three-value output (H, OPEN, L).
13	NC	—	NC
14	D-PG. MM	I	CR for drum PG signal delay.
15	D-PG	I	Drum PG signal input.
16	NC	—	NC
17	D-FG	I	Drum FG signal input.
18	DSE	O	Outputs the speed error for drum system speed control. An output making the drum motor stop is delivered when DRUM-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
19	FHE	O	Outputs the horizontal sync signal of the composite sync signal after F-V conversion (using the drum phase control system). The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
20	DPE		Error output for drum system phase control. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
21	C-START/STP	O	Outputs the capstan motor start and brake pulses in the slow mode.
22	CSE	O	Capstan system speed error output. An output making the capstan motor stop is delivered when CAP-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
23	CPE	O	Capstan system phase reciprocal error output. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
24	$\overline{\text{F}}$/R	O	Capstan motor forward/reverse control output. "1" sets the reverse mode, and "0" the forward mode.
25	C-FG1	I	Capstan FG signal input.
26	NC	—	NC
27	NC	—	NC
28	EP/LP/SP	O	Recording mode output. Three-value output ("H" is for EP mode, "M" for LP mode and "L" for SP mode).
29	SP	O	Recording mode output. "H" is for SP mode.
30	CAP-BRK	I	Control input for capstan brake timing. (MC-BR)
31	TRK-CR	I	CR for tracking adjustment.
32	NC	—	NC
33	D-WD1	I	CR for drum compensation timing adjustment in the slow mode.
34	NC	—	NC
35	REF-TRK	O	Outputs the tracking delay input signal.
36	MODE (× 2+STILL)	O	Mode decoding signal output. At the × 2 SPEED mode and starting time of SLOW/STILL mode, output "H" level.
37	NC	—	NC
38	1/0-CK	O	Outputs the CTL signal for realtime counter.
39	SV-S・CLK	I	Serial transmission clock pulse input.
40	SV-S・DATA	I	Serial data input terminal.
41	NTSC/$\overline{\text{PAL}}$	I	NTSC/PAL switching input. "H" is for NTSC, "L" for PAL.
42	VDD		+ 5V supply terminal

LC7416

IC711 (M50

Pin No.	Port
1	Vcc
2	P65
3	P64
4	P63/PWM3
5	P62/PWM2
6	P61/PWM1
7	P60/T
8	P27
9	P26
10	P25
11	P24
12	P23
13	P22
14	P21
15	P20
16	P37/$\overline{\text{Srdy}}$
17	P36/CLK
18	P35/Sout
19	P34/Sin
20	P33/ANin
21	P32/CNTR
22	P31
23	P30
24	P53/INT1
25	P52/INT2
26	CNVss
27	$\overline{\text{RESET}}$
28	Xin
29	Xout
30	Xcin
31	Xcout
32	Vss
33	φ
34	P57
35	P56
36	P55
37	P54
38	Vp
39	P51
40	P50
41	P17
42	P16
43	P15
44	P14
45	P13
46	P12
47	P11
48	P10
49	P07
50	P06
51	P05
52	P04
53	P03
54	P02
55	P01
56	P00
57	P47
58	P46
59	P45
60	P44
61	P43
62	P42
63	P41
64	P40

NOTE : Clock frequency
1. Connect the anode
and the cathode to
($\overline{\text{RESET}}$) terminal or
2. The clock frequency
terminal of Pin 7 a
3. In order to set norm
of Pin 27 ($\overline{\text{RESET}}$
removing the diode

IC351 (LC7416) DIGITAL SERVO IC PIN FUNCTIONS TABLE

Pin No.	I/O Terminal Name	I/O	Input/Output Function
1	FSC IN	I	Input for the IC internal system clock pulse. A level of at least 0.3 Vp-p is required. The color subcarrier signal is input by capacitive coupling.
2	Vss		Ground
3	C-SYNC	I	Composite sync signal input.
4	VD	O	Dummy V_D signal output.
5	NC	—	NC
6	NC	—	
7	RF-SW-PULSE	O	Video head switching pulse output.
8	AF-SW-PULSE	O	Audio head (FM) switching pulse output.
9	DL1	I	Dummy V_D insertion position control CR.
10	CTL-IN	I	Control signal input.
11	REMAK	O	Outputs the control signal re-recording control signal. Three-value output (H, M, L).
12	REC-CTL	O	Recording control signal output. Three-value output (H, OPEN, L).
13	NC	—	NC
14	D-PG. MM	I	CR for drum PG signal delay.
15	D-PG	I	Drum PG signal input.
16	NC	—	NC
17	D-FG	I	Drum FG signal input.
18	DSE	O	Outputs the speed error for drum system speed control. An output making the drum motor stop is delivered when DRUM-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
19	FHE	O	Outputs the horizontal sync signal of the composite sync signal after F-V conversion (using the drum phase control system). The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
20	DPE		Error output for drum system phase control. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
21	C-START/STP	O	Outputs the capstan motor start and brake pulses in the slow mode.
22	CSE	O	Capstan system speed error output. An output making the capstan motor stop is delivered when CAP-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
23	CPE	O	Capstan system phase reciprocal error output. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
24	F/R	O	Capstan motor forward/reverse control output. "1" sets the reverse mode, and "0" the forward mode.
25	C-FG1	I	Capstan FG signal input.
26	NC	—	NC
27	NC	—	NC
28	EP/LP/SP	O	Recording mode output. Three-value output ("H" is for EP mode, "M" for LP mode and "L" for SP mode).
29	SP	O	Recording mode output. "H" is for SP mode.
30	CAP-BRK	I	Control input for capstan brake timing. (MC-BR)
31	TRK-CR	I	CR for tracking adjustment.
32	NC	—	NC
33	D-WD1	I	CR for drum compensation timing adjustment in the slow mode.
34	NC	—	NC
35	REF-TRK	O	Outputs the tracking delay input signal.
36	MODE (×2+STILL)	O	Mode decoding signal output. At the ×2 SPEED mode and starting time of SLOW/STILL mode, output "H" level.
37	NC	—	NC
38	1/0-CK	O	Outputs the CTL signal for realtime counter.
39	SV-S・CLK	I	Serial transmission clock pulse input.
40	SV-S・DATA	I	Serial data input terminal.
41	NTSC/PAL	I	NTSC/PAL switching input. "H" is for NTSC, "L" for PAL.
42	V_{DD}		+ 5V supply terminal

LC7416

P66308-0

IC711 (M50958) TIMER MPU PIN FUNCTIONS TABLE

Pin No.	Port	Input/Output Signal	I/O	Input/Output Function
1	Vcc			+ 5V
2	P65	I/BG	O	PAL transmission system switching ("L" = PAL I ; "H" = PAL BG)
3	P64		–	
4	P63/PWM3	BAND1	O	Band data output (BAND1, BAND2) ・ (L, L) = VHF-LOW (L, H) = VHF-HIGH (H, L) = UHF (H, H) = SKIP
5	P62/PWM2	BAND2	O	
6	P61/PWM1	PWM	O	Tuning voltage output. (PWM signal)
7	P60/T	ADJUST	O	Pulse output (32.768kHz/1024 = 32Hz) for clock frequency adjustment.
8	P27	$\overline{CLK}$	O	Clock pulse output to the E^2 PROM.
9	P26	DI	I/O	Data exchange with the E^2 PROM.
10	P25	$\overline{E^2\ PROM\ CST}$	O	E^2 PROM 1 is accessed when "L".
11	P24	$\overline{PAL}$/SECAM	O	Transmission system switching ("L" = PAL ; "H" = SECAM).
12	P23	VIDEO MUTE	O	"H" output during VIDEO MUTE
13	P22	TUNER ON	O	"H" output when tuner power is ON.
14	P21	$\overline{AUDIO\ MUTE}$	O	"L" output during AUDIO MUTE.
15	P20	AFT MUTE	O	"H" output during AFT MUTE.
16	P37/Srdy	$\overline{CH+}$	O	CH + system switching ("L" = CH + ON)
17	P36/CLK	$\overline{S.CLK}$	I	SSB clock pulse input.
18	P35/Sout	$\overline{S.OUT}$	O	SSB data output.
19	P34/Sin	S.IN	I	SSB data input.
20	P33/ANin	AFT.C	I	AFT.S curve input.
21	P32/CNTR	H.SYNC	I	Sync. detection signal input for existing channel discrimination. ("L" = Existing Sync.)
22	P31	SCL	O	Clock pulse output to the VPS decoder IC.
23	P30	SDA	I/O	Data exchange with the VPS decoder IC.
24	P53/INT1	$\overline{POWER\ DOWN}$	I	Power failure mode set at "L" input.
25	P52/INT2	IR SIG. IN	I	Remote control signal input.
26	CNVss			Ground.
27	$\overline{RESET}$			Reset terminal.
28	Xin			6MHz clock terminal.
29	Xout			
30	Xcin			32.768kHz (clock OSC used in the power failure mode)
31	Xcout			
32	Vss			Ground
33	ϕ			
34	P57	KEY IN4	I	Key inputs
35	P56	KEY IN3	I	
36	P55	KEY IN2	I	
37	P54	KEY IN1	I	
38	Vp	Vp		-30V
39	P51	STEREO R	O	2-bit signal output for AUDIO OUTPUT SELECT and audio output display indication according to table below.
40	P50	STEREO L	O	
41	P17	o	O	Display segment outputs. (Included key-scan output)
42	P16	n	O	
43	P15	m	O	
44	P14	l	O	
45	P13	k	O	
46	P12	j	O	
47	P11	i	O	
48	P10	G9	O	Display grid outputs.
49	P07	G8	O	
50	P06	G7	O	
51	P05	G6	O	
52	P04	G5	O	
53	P03	G4	O	
54	P02	G3	O	
55	P01	G2	O	
56	P00	G1	O	
57	P47	h	O	Display segment outputs. (Included key-scan output)
58	P46	g	O	
59	P45	f	O	
60	P44	e	O	
61	P43	d	O	
62	P42	c	O	
63	P41	b	O	
64	P40	a	O	

NOTE : Clock frequency check with ADJUST terminal of Pin 7.

1. Connect the anode of the diode (IS188 etc.) to Pin 44 (key-scan I) and the cathode to Pin 37 (KEY IN 1). Then ground the Pin 27 ($\overline{RESET}$) terminal once and reset the microcomputer.
2. The clock frequency (32 Hz) can be observed with the ADJUST terminal of Pin 7 according to the servicing above.
3. In order to set normal function mode again, ground the terminal of Pin 27 ($\overline{RESET}$) once and reset the microcomputer after removing the diode connected to Pins 44 and 37.

PORT \ MODE	NORMAL	MAIN	SUB	STEREO
STEREO R (Pin 39)	L	L	H	H
STEREO L (Pin 40)	L	H	L	H

P50958V0

SECTION 5

MECHANISM SERVICE TECHNICAL INFORMATION

1. OUTLINE OF MECHANISM

This mechanism is named P-90 Mechanism. Its features include :

(1) The chassis is fabricated by drawing a 1.6mm thick electric zinc plated steel sheet, and mechanical parts are ingeniously laid on this chassis. The mechanism is as thick as 70.3 mm.

(2) After insertion of a cassette, the tape is normally wound to the head drum based on the full loading system. This design results in the shortening of the mode shift time, that is, the time from the depression of the PLAY pushbutton switch to the video image display on screen has been significantly quickened.

(3) The full loading system employed has the F/R search capability (when the same button (F.FWD or REW) is pressed in the F.FWD or REW modes, the search mode playback image appears on the screen).

(4) Also, a thin type head drum without lead is provided to increase the operating convenience of the equipment to a considerable extent.

(5) The drive source for cassette loading and the motor for the tape loading mode selection are used in combination with the head motor and the capstan motor for realization of a 3-motor system.

1-1. FULL LOADING MECHANISM

(1) Description of full loading mechanism
As shown in Fig. 1-1 a tape has hitherto been wound onto the head drum only in the PLAY and F/R SEARCH mode, but in this radically new mechanism, in every mode can be made with the tape kept wound onto the head drum.

(2) Features of full loading mechanism
With the provision of the full loading mechanism, the operating convenience, which was hitherto a drawback of the VHS system, has been improved. A host of other salient features are also designed into this mechanism as apparent from the following description.

I. Quick playback
Mode shift time such as the STOP→PLAY and FF/REW→PLAY has been shortened for quicker playback.

II. High-speed VISS
The time from the detection of VISS search signal based on the VHS standardized search system till image display on the screen has considerably been shortened to make high-speed VISS possible.

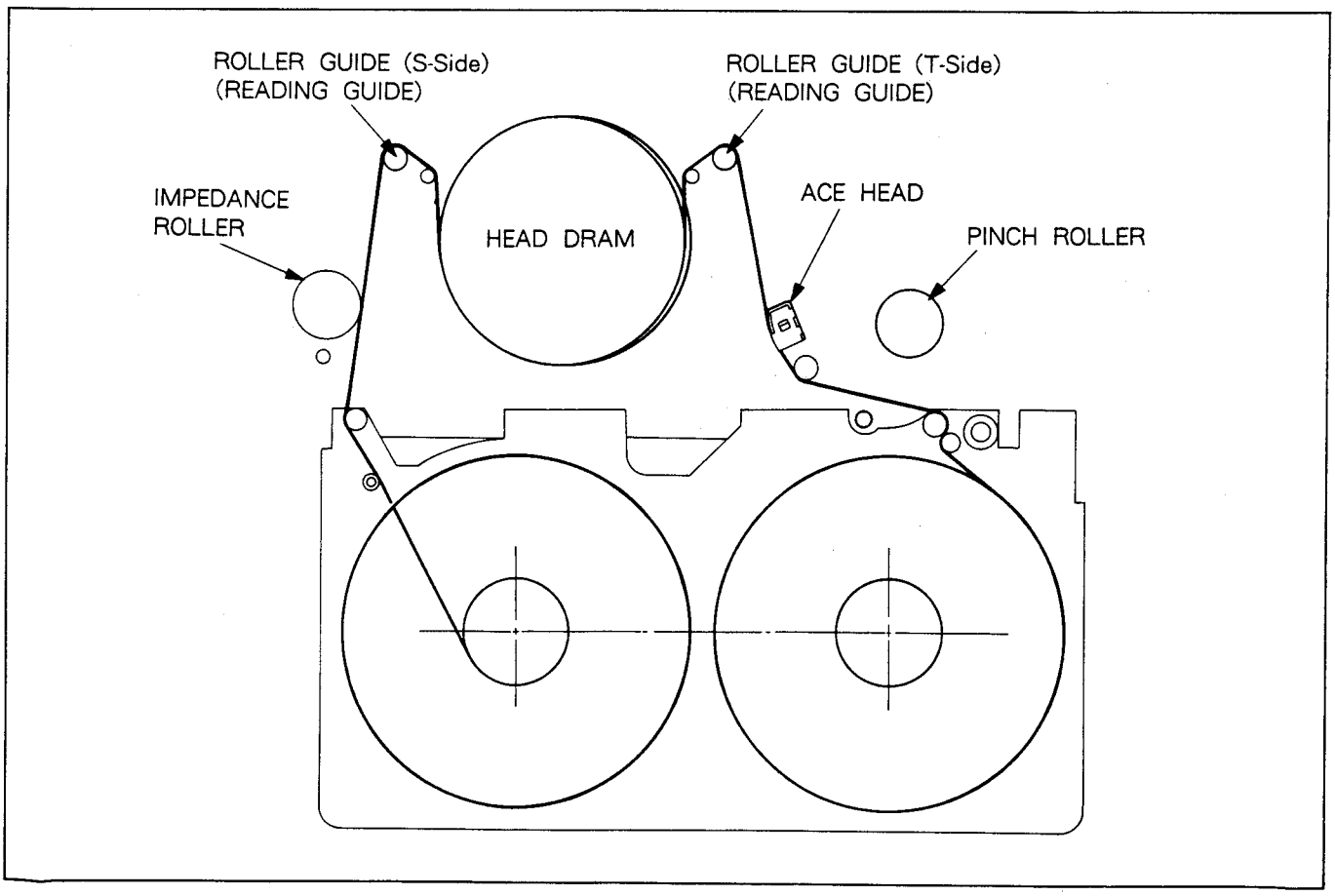


Fig. 1-1 FULL LOADING SYSTEM (AT FF/REW MODE)

III. F/R search
FF↔F-SEARCH and REW↔R-SEARCH can be made direct by reducing the mode transition time.

(3) Protection mechanism for full loading system

I. Video Tape Protection Mechanism
(a) FF/REW→STOP
Tape tension applied to the head drum when stopping is lowered by optimizing the balance between the left and right, and brake forces acting on the left and right reel table. Thereby it prevents from causing a scratch on the tape due to V-head when stopping.
(b) STOP→FF/REW
The starting-up speed of the capstan motor is ingeniously designed to preclude the possibility of unusual tape tension at the time of REW/FWD start-up.
(c) Tape end brake damping
The design of the mechanism is so made that the time from issuance of an electrical STOP command till actual brake application is reduced to a minimum. This enable the braking to be completed before the reader tape end.
(d) FF/REW running
To ensure highly stable tape running in any condition and any environment, design consideration is given to the foundation brake torque (soft brake) to the reel table and the tape winding angle with respect to each tape guide. Particularly in regard to the supply side fixing guide and F.T.E (Full Track Erase) head, the design is so made that they do not come into contact with the tape at the time of FF/REW operation to alleviate load application.

II. Final End Position Tape Loading Protection Mechanism
Tape pull-out (loading) from within the cassette is done to ensure proper take-up of the tape onto the head drum. At that time, the tape is extended from the supply reel side.
So, if the tape is wound to the final end, no loading can be made. For this reason, a mode is designed to allow the tape to be rewound a little at the final end of the tape without any loading done.

2. DESCRIPTION OF MECHANISM OPERATION

2-1. BASIC OPERATION MODE OF MECHANISM

The P-90 mechanism has its original modes such as given in Table 2-1, in addition to the VTR is operation modes (STOP, FF, REW, PLAY, REC, R-SEARCH, F-SEARCH, STILL, SLOW, and ETS). These modes specific to the mechanism play important roles in tape protection operation at the time of a shift to various modes of the VTR above. A shift to the mode specific to the mechanism is carried out by controlling the rotation of the loading motor with the control signal of the system control circuit. The detection of important mechanism operation mode positions is done by using the FL START SWITCH for detecting the cassette ejection/insertion, and the MECHANISM MODE SWITCH for detecting each mode of the mechanism (3 bit MODE DATA is output by operating the rotary switch).

Mechanism Mode	Mechanism Mode Switch 3	2	1	HEX DATA	Function
EJECT	–	–	–		Eject position
					Front loading/Unloading
SHORT REW	–	–	–		Take up operation in the tape end position
INITIAL	1	1	1	⑦	Power off position
					Tape unloading position / Tape loading / Tape loading ending position
BRAKE	0	0	1	①	Main brake applying position
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.
PLAY	1	0	0	④	From FWD direction Normal running mode
IDLER	1	0	1	⑤	Forward/reverse changeover position
REV	1	1	0	⑥	From REV direction Normal running mode

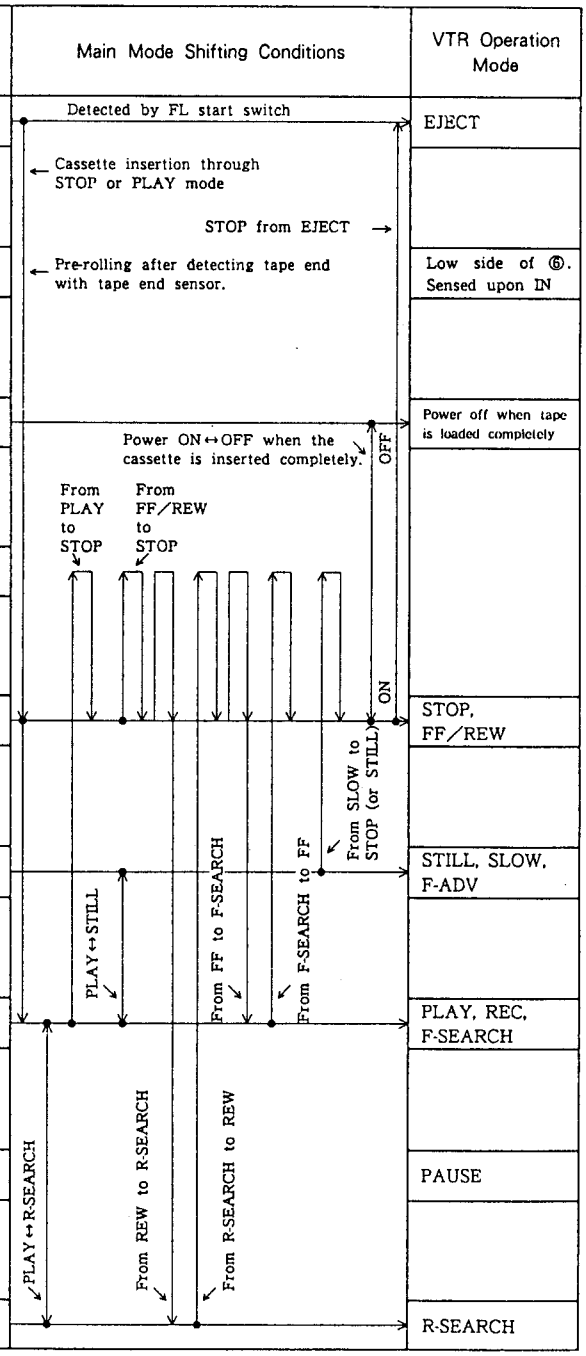


Table 2-1

2-2. DESCRIPTION OF MECHANISM DRIVE

To realize the thin type mechanism, a loading motor and two pieces of cam (MAIN CAM GEAR and the MODE CAM GEAR) to be driven by the said motor are mounted on the upper part of the capstan motor, that was a dead space in the conventional mechanisms hitherto available with a view to optimization of parts mounting layout. (Fig. 2-1 and Fig. 2-2.)

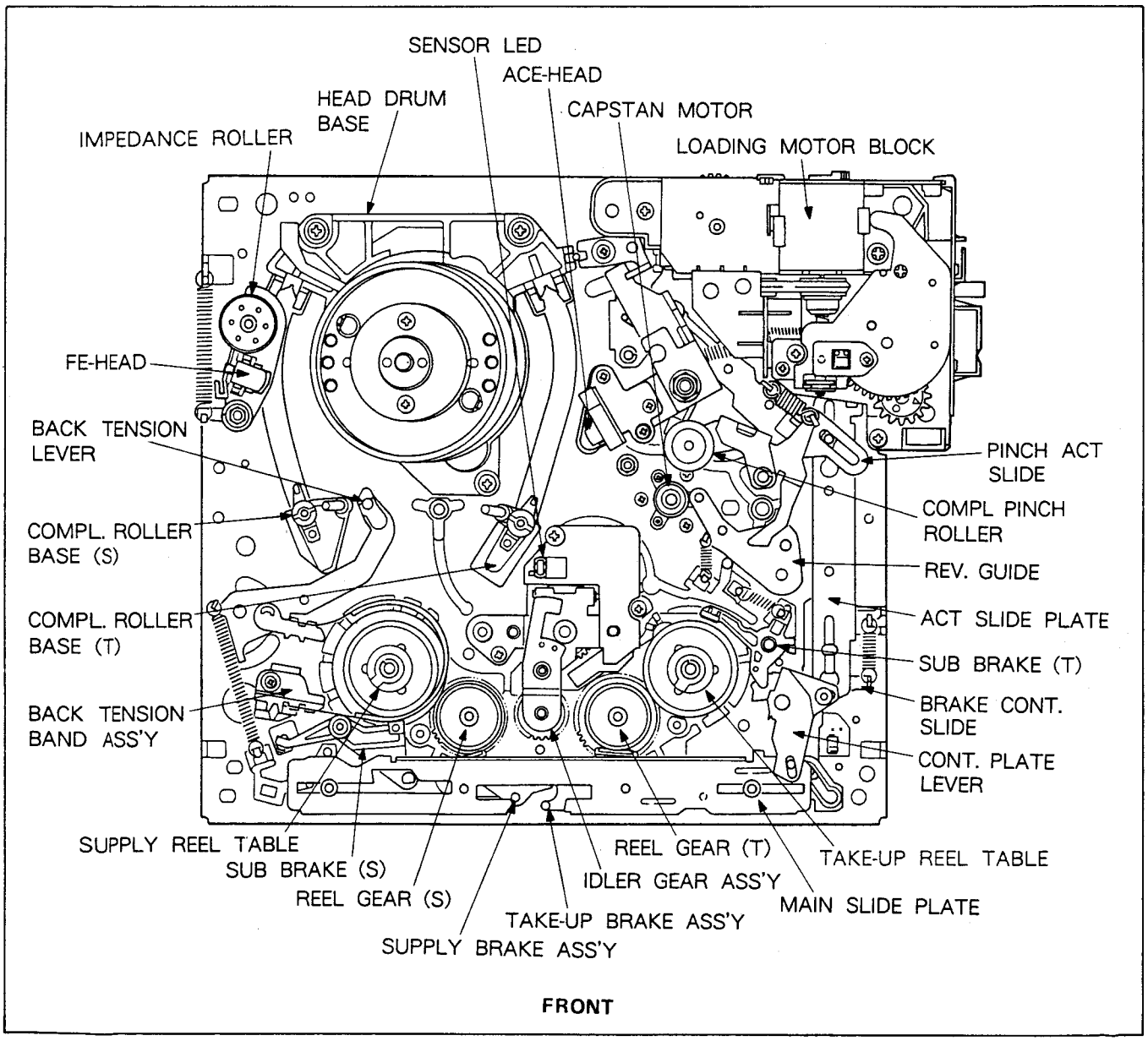


Fig. 2-1 TOP VIEW OF MECHANISM (INITIAL MODE)

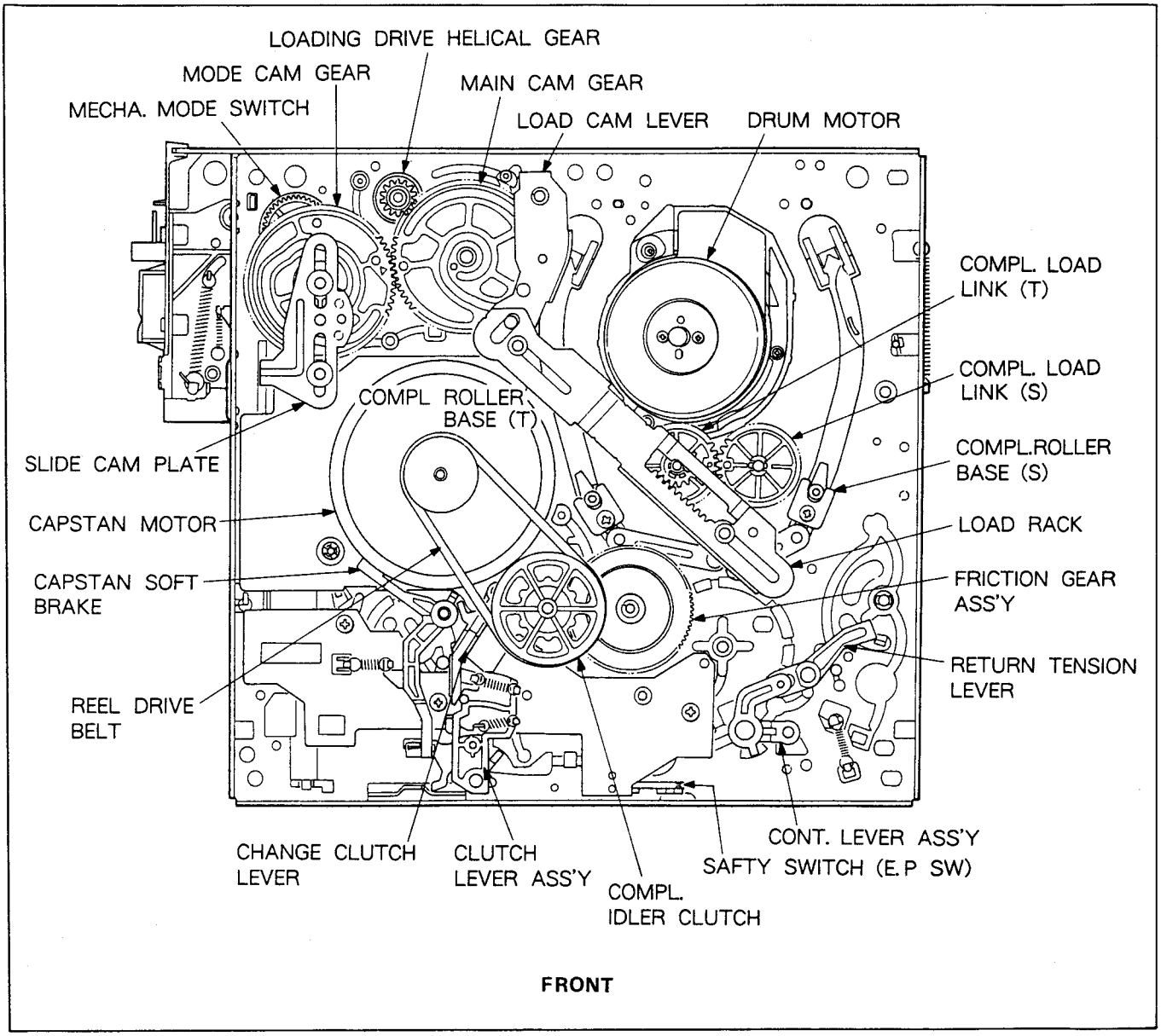


Fig. 2-2 BOTTOM VIEW OF MECHANISM (INITIAL MODE)

These two cams have one CAM GROOVE on both sides. A total of four CAM GROOVEs performs independent functions to meet the multi-function needs of these days by driving the elements of a wide variety of functions with the motor precisely controlled by a microcomputer.
The two cams are positive motion cams having a groove over 570 degrees. These cams cause the amount of lift to be changed by a mild gradient according to the angle of rotation while synchronizedly being rotated by an outer circumferential gear to alleviate the load exerted on the cams when driving the rod linked with the cams and also to ensure position stability in each mode of operation. The geometry of each cam and that of a metal fitting of the drive section are shown in Fig. 2-3 and Fig. 2-4, respectively. Also, the role of each cam used is described below.
On the GROOVE 3 side of MODE CAM GEAR have a small gear.

This small gear is engaged with the MECHANISM MODE SWITCH as shown in Fig. 2-3., and detect the mechanism operation mode. In this way, the two cams and the MECHANISM MODE SWITCH are rotated synchronously, and the mechanism is fully synchronized and driven for each mode.

MAIN CAM GEAR : CAM GROOVE 1.
Pinch roller pressing operation
CAM GROOVE 2.
Tape loading mechanical drive
MODE CAM GEAR : CAM GROOVE 3.
Brake and clutch selecting operation
CAM GROOVE 4.
Brake control and front unloading control

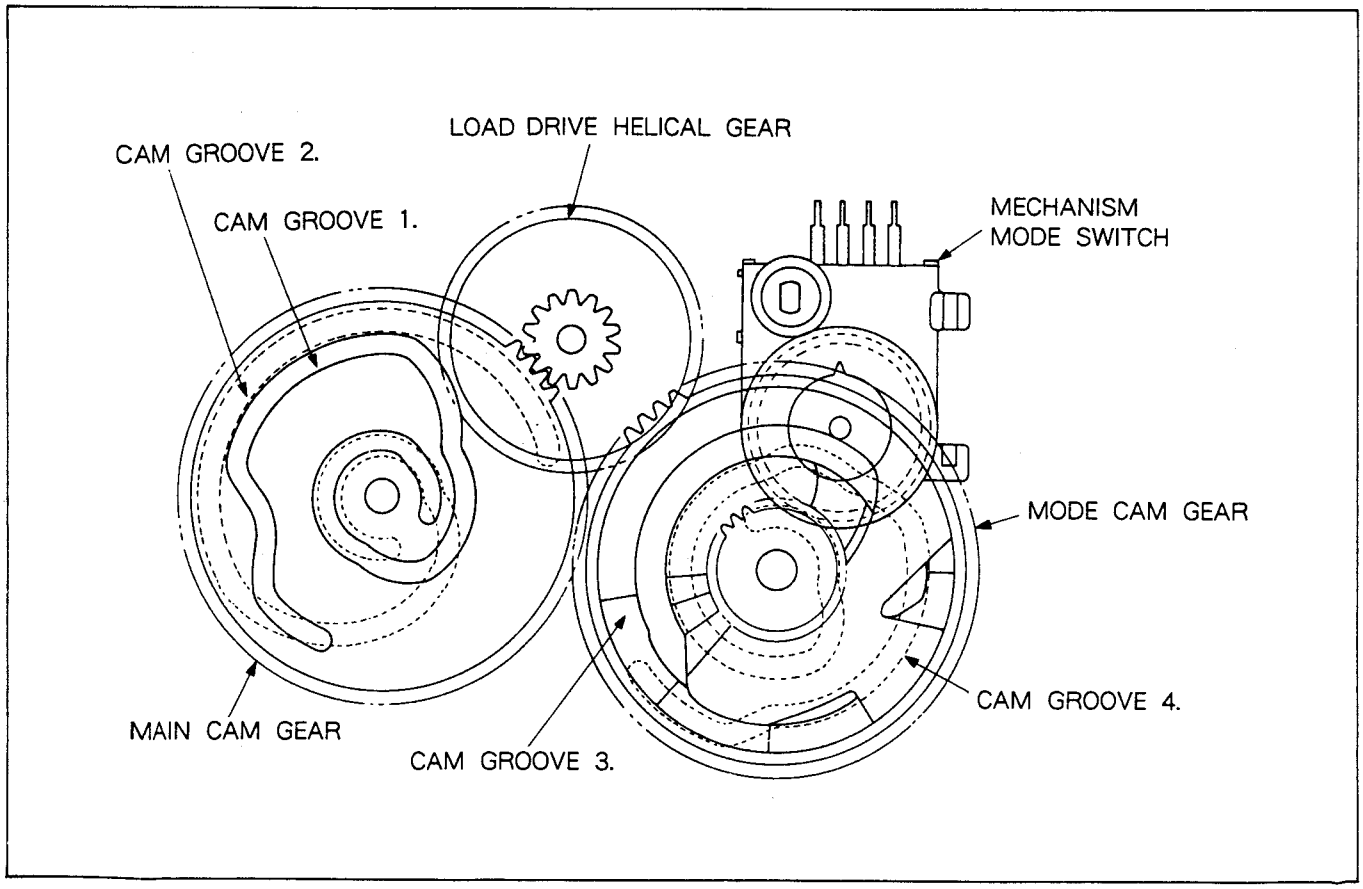


Fig. 2-3 PLAN OF CAMS CONSTRUCTION

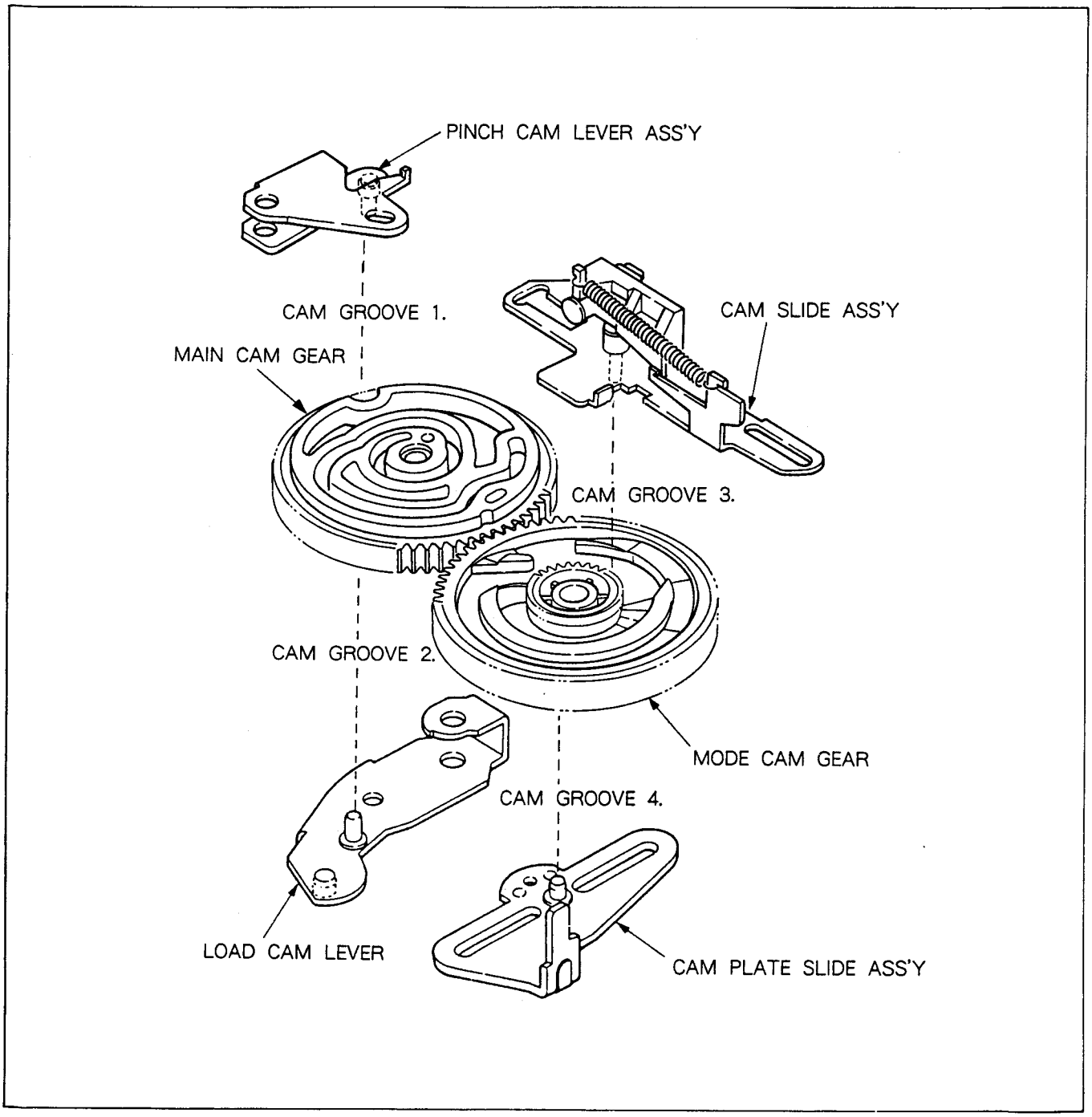


Fig. 2-4 VIEW OF CAMS CONSTRUCTION

2-2-1. Tape Loading Mechanism

The tape loading mechanism is compactly designed with use of a LOAD RACK for loading by drive from the before-mentioned MAIN CAMs with CAM GROOVE 2. The LOAD RACK is laid on the dead space in between the DD capstan motor and the head motor for effective space utilization.(Fig. 2-5) The process from tape pull-out upon loading to contact of the leading guide section with the stopper of drum base and press-fitting under tension of spring is guided and driven in such a manner that the rod is drawn inward from the outer circumferential direction of the CAM GROOVE 2, thereby reducing the load torque (PV value) to the CAM GROOVE. And, the load of the loading motor is minimized to enhance reliability.

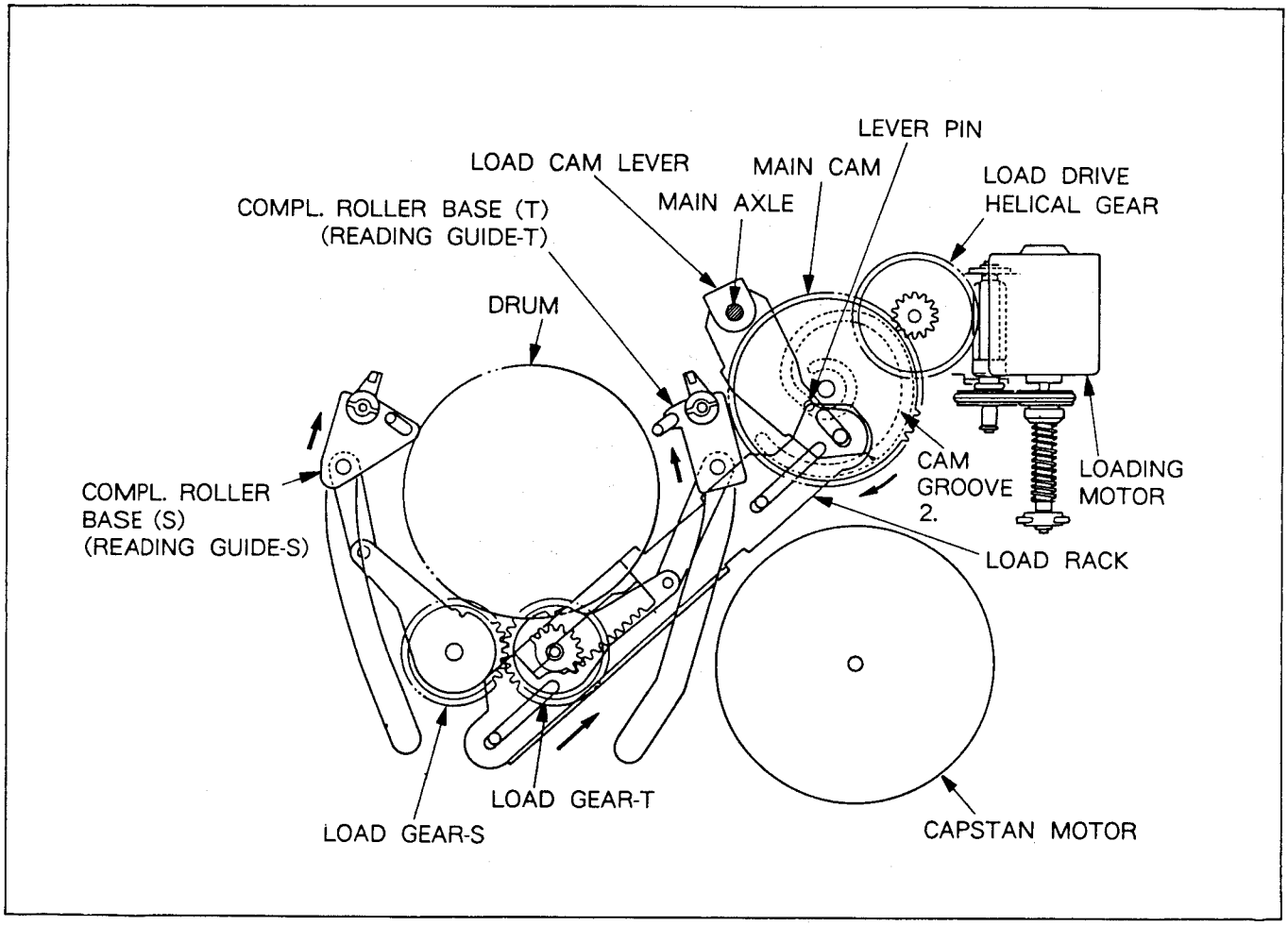


Fig. 2-5 CONSTRUCTION OF TAPE LOADING MECHANISM

2-2-2. Pinch Roller Pressing Mechanism

The PINCH LEVER assembly of the pinch roller is operated by the PINCH CAM LEVER (rod) driven by the CAM GROOVE 1 of the before-mentioned MAIN CAM, and then press-fitted to the capstan. The revolving tape guide (REV.GUIDE) is interlockingly operated with the PINCH LEVER assembly to ensure stable tape running at a fixed speed. (Fig. 2-6)

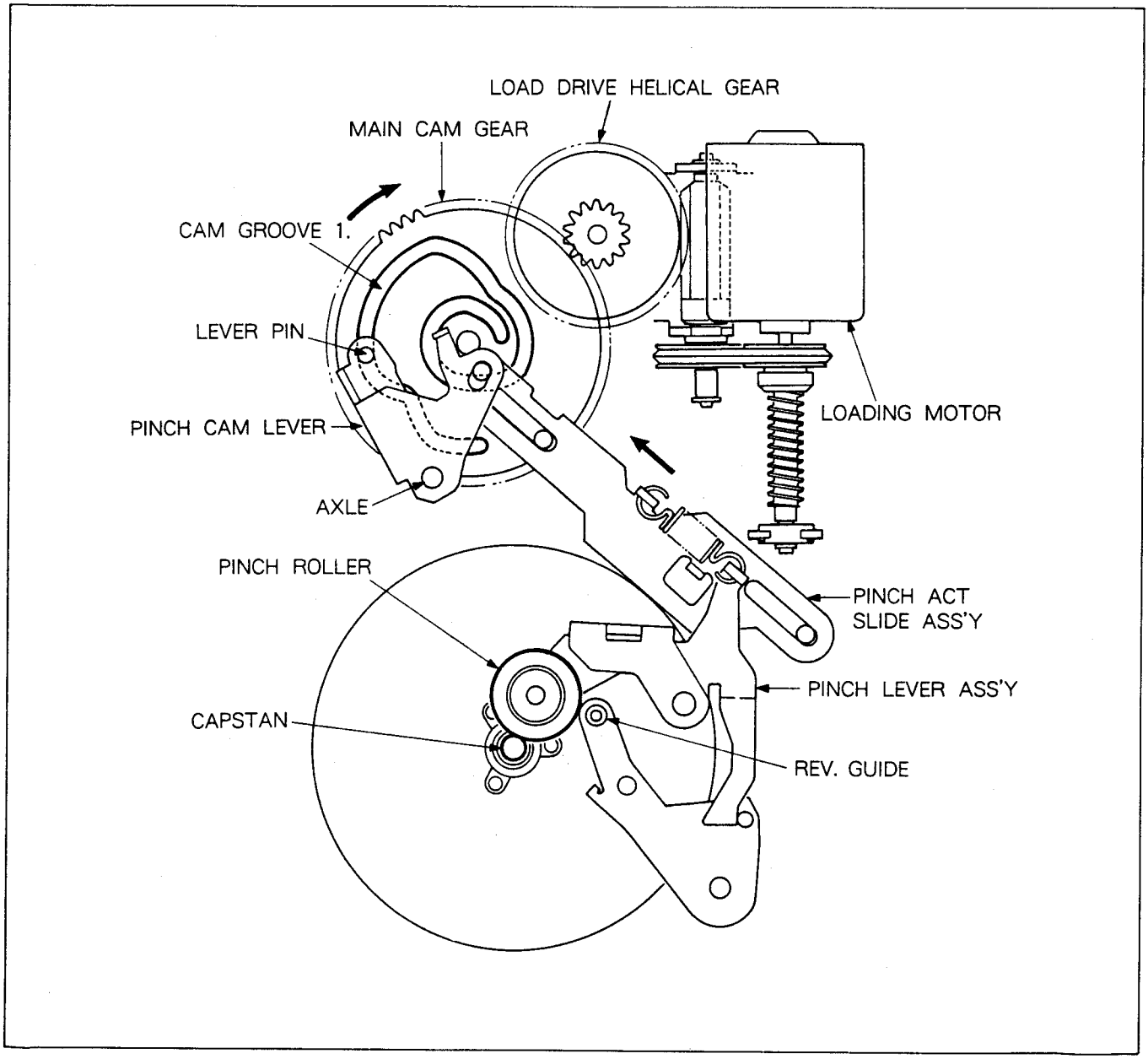


Fig. 2-6 CONSTRUCTION OF PINCH ROLLER MECHANISM

2-2-3. Operation of Brake Control Plate

The ACT SLIDE PLATE and the MAIN SLIDE PLATE shown in Fig. 2-7 is driven by the CAM GROOVE 4 of the MODE CAM GEAR for precise control of operations including the control of back tension lever, auxiliary brake (SUB BRAKE S/T), main brake (SUPPLY BRAKE and TAKE-UP BRAKE), clutch selection, and drive selection of front loading mechanism.

Also, the mechanism mode switch is engaged with the small gear of the MODE CAM GEAR for sync rotation. At the time, the detection position of each mode is set so that it becomes the flat section at the cam curve of the CAM GROOVE 4 of the MODE CAM GEAR. So, even if motor stop time deviation occurs due to the load following the detection of the loading motor stop position, the control plate linked with a stop in the specified position.

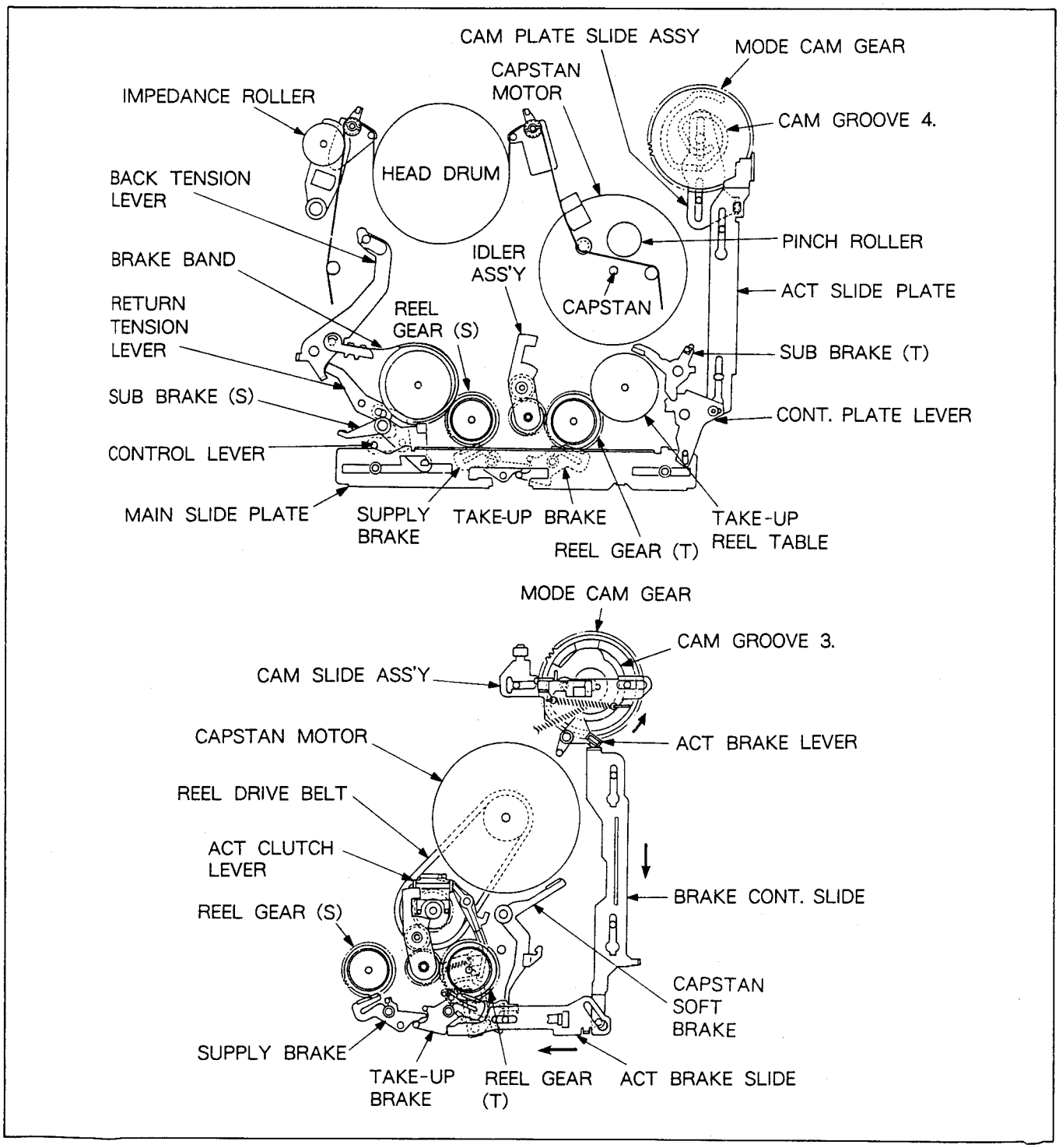


Fig. 2-7 CONSTRUCTION OF BRAKE CONTROL PLATE (AT REW/FF, STOP MODE)

2-2-4. Brake Control Mechanism

The mechanical logic of the brake state is shown in Fig. 2-8. The brake which damps the reel rotation is operated by the BRAKE CONTROL SLIDE driven from the CAM GROOVE 3 of the MODE CAM GEAR.

Also, to alleviate damage to the tape caused by high tension of the brake in operation, the tape is stopped after brake operation and the shape is thoughtfully designed for proper biting-in ratio of the left and the right brakes after-mentioned to each other.

This enables the supply brake to be released by the operation of the above-mentioned MAIN SLIDE PLATE after an elapse of prefixed slight time to reduce the tape tension to zero, and to provide the tape with a proper degree of looseness. As a result, a slight gap is created in the tape from the HEAD DRUM.

Further, a momentary still mechanism which dispenses with use of a plunger solenoid is not provided as one of design features of the P-90 mechanism.

To stabilize the image in an extremely short period of time during a shift to the STILL mode from the PLAY mode, the auxiliary brake (CAPSTAN SOFT BRAKE) is press-fit to the outer circumference of the capstan motor by the before-mentioned CAM GROOVE 3 of the MODE CAM GEAR.

These operations is interlocked with the operation of the before-mentioned ACT SLIDE PLATE and the MAIN SLIDE PLATE. It consists of one MODE CAM for offsetting the operating position.

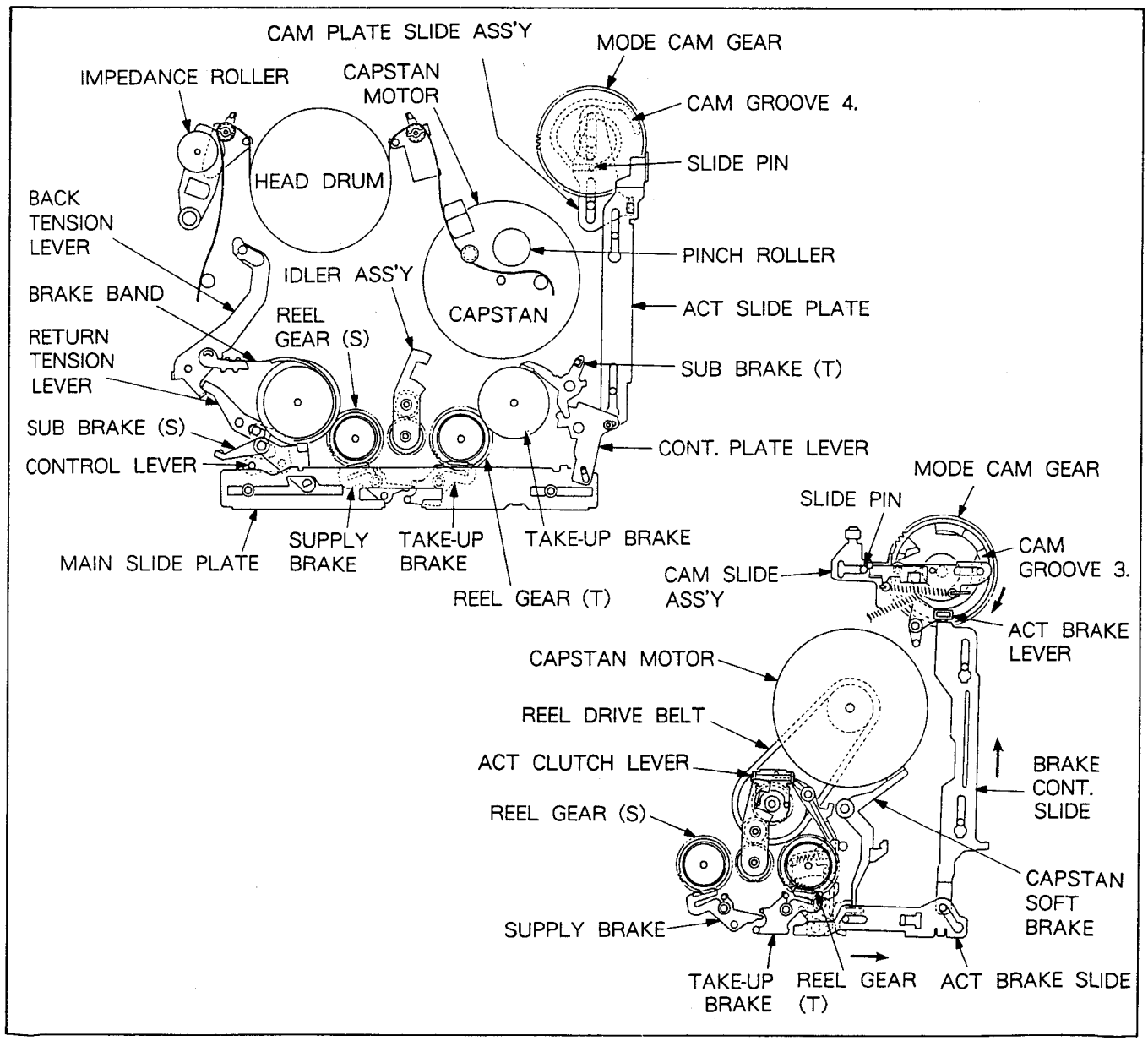


Fig. 2-8 CONSTRUCTION OF BRAKE CONTROL PLATE (AT BRAKE MODE)

2-2-5. Brake Lock Release Mechanism (FF/REW→STOP Mode)

The brake lock momentary release mechanism is shown in Fig. 2-9 ⓐ, ⓑ and Fig. 2-10.
In the FF/REW mode (Fig. 2-9 ⓐ) mechanical elastic load is given to the BRAKE LOCK LEVER mounted on the BRAKE CAM SLIDE which causes the brake to operate, and it is locked to the high-speed rotary axle of the 1st reducing section of the loading motor.

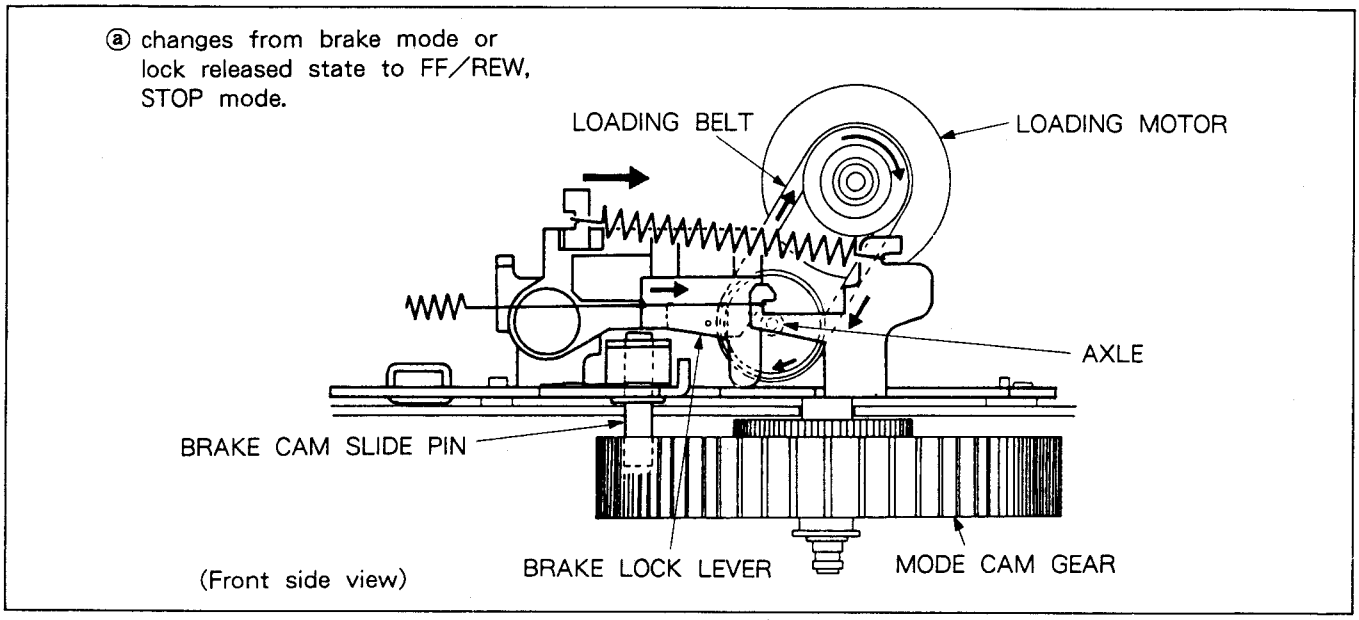


Fig. 2-9 ⓐ BRAKE LOCK & RELEASE MECHANISM

At the time of a shift to the STOP mode from the FF/REW (Fig. 2-9 ⓑ), the BRAKE LOCK LEVER releases the lock on slight rotation of the axle by contact between the rotary shaft and the friction resistance so that the brake can be instantaneously applied to the reel. The lock release speed is almost the same as the start-up of the loading motor. So, the its response to the brake is very quick, and construction is simplified also.

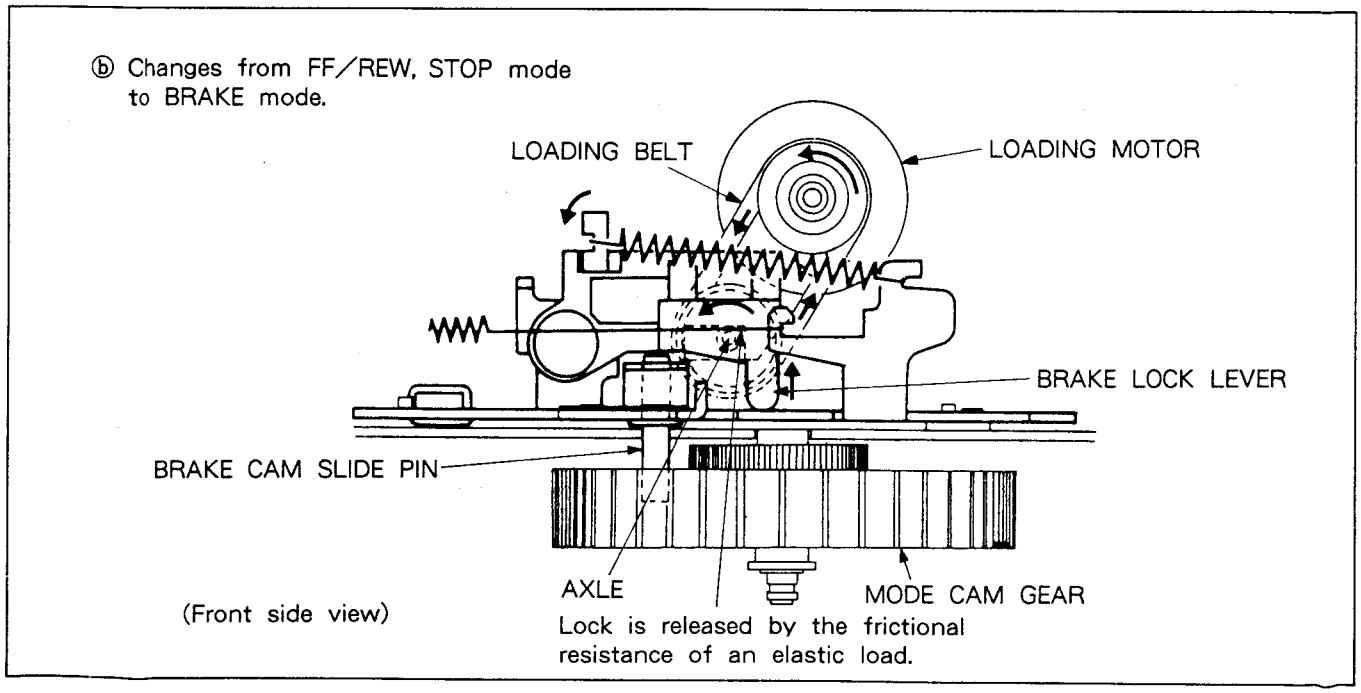

ⓑ Changes from FF/REW, STOP mode to BRAKE mode.
LOADING BELT
LOADING MOTOR
BRAKE LOCK LEVER
BRAKE CAM SLIDE PIN
AXLE
MODE CAM GEAR
(Front side view)
Lock is released by the frictional resistance of an elastic load.

Fig. 2-9 ⓑ BRAKE LOCK & RELEASE MECHANISM

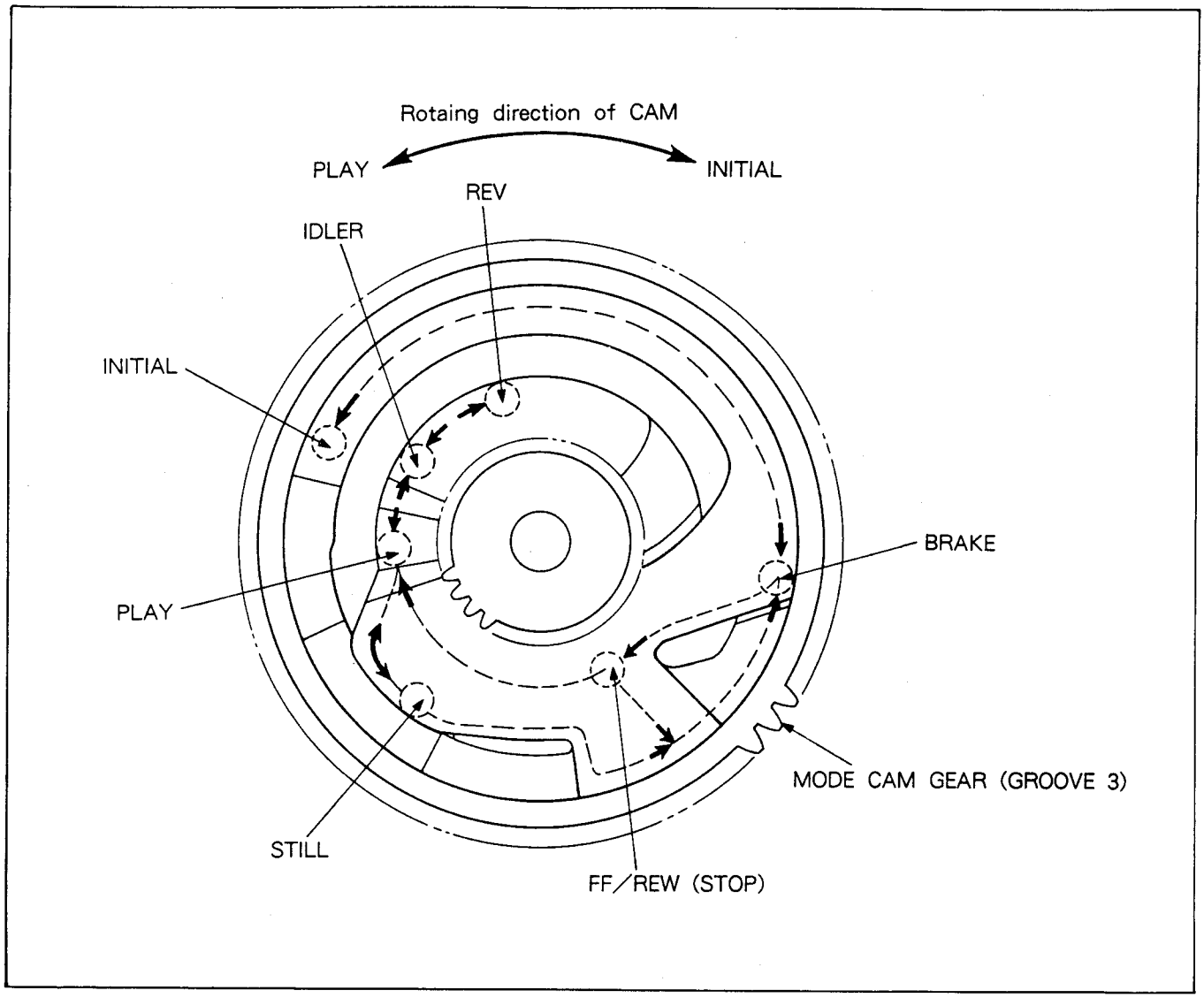


Fig. 2-10 POSITIONING OF BRAKE CAM SLIDE-PIN ON THE GROOVE 3 OF MODE CAM GEAR

2-3. REEL TABLE DRIVE

2-3-1. Reel Table Drive Mechanism

This mechanism employs the system of driving the tape from the DD capstan motor via rubber belt. In the tape constant speed running mode for PLAY, F-SEARCH, and R-SEARCH, the capstan and the pinch roller are press-fitted to allow the tape to run at a constant speed. By providing a FRICTION MECHANISM in between the capstan motor and the reel table, the tape is taken up. In the FF/REW tape high-speed take-up mode, the capstan and the pinch roller are separated from each other, and the capstan motor and the reel table are linked direct by the clutch mechanism to carry out tape take-up. Also, to realize a thin type reel table drive section, the mechanism is simplified and the rotary parts are thinned for realization of physically compact design, and a step is provided on the reel table mounting section of the chassis by high-precision drawing process. A simplified figure of the drive mechanism is shown in Fig. 2-11 and Fig. 2-12. Power transmission to the pulley of the clutch mechanism section is done from the DD capstan motor via rubber belt.

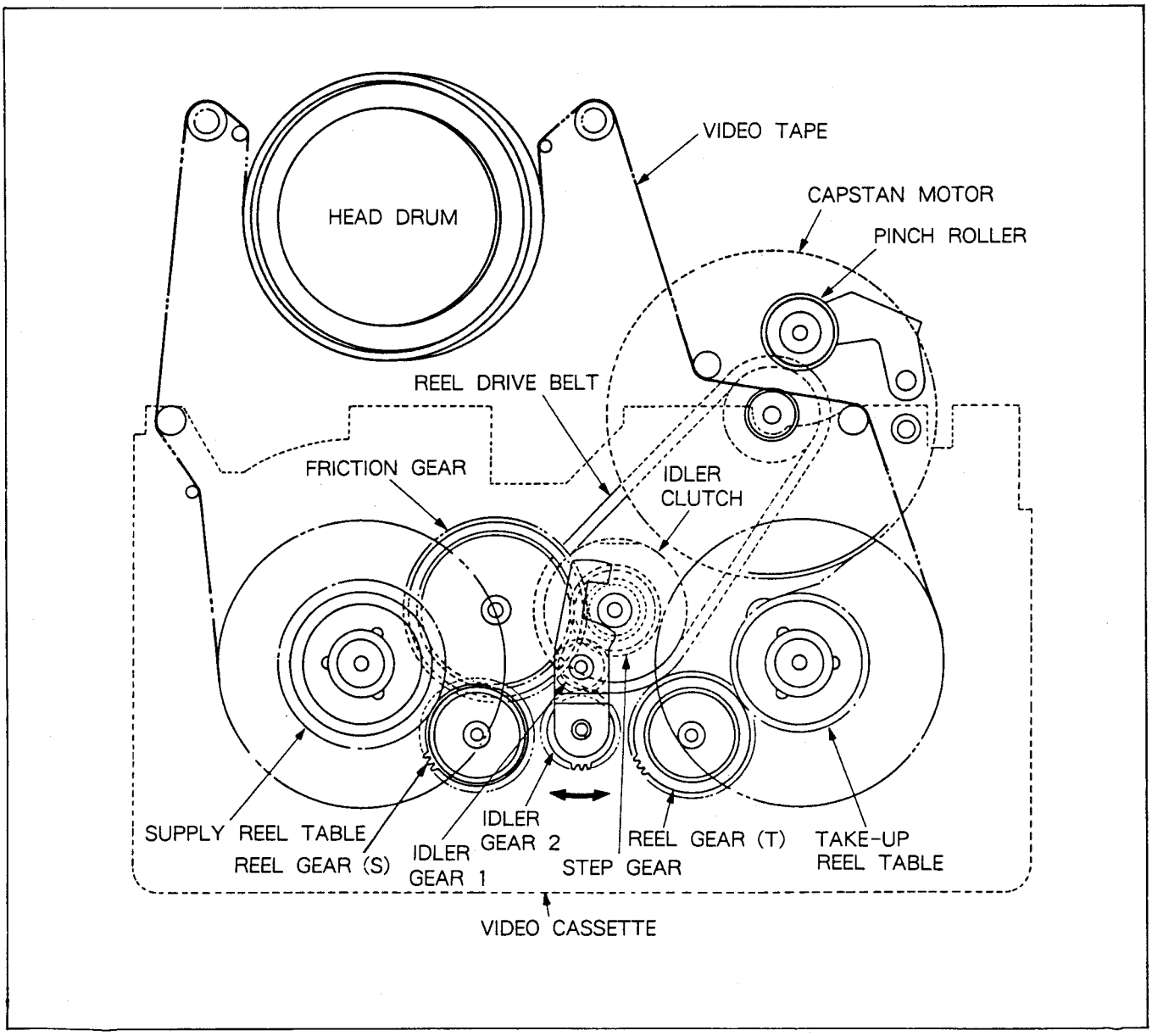
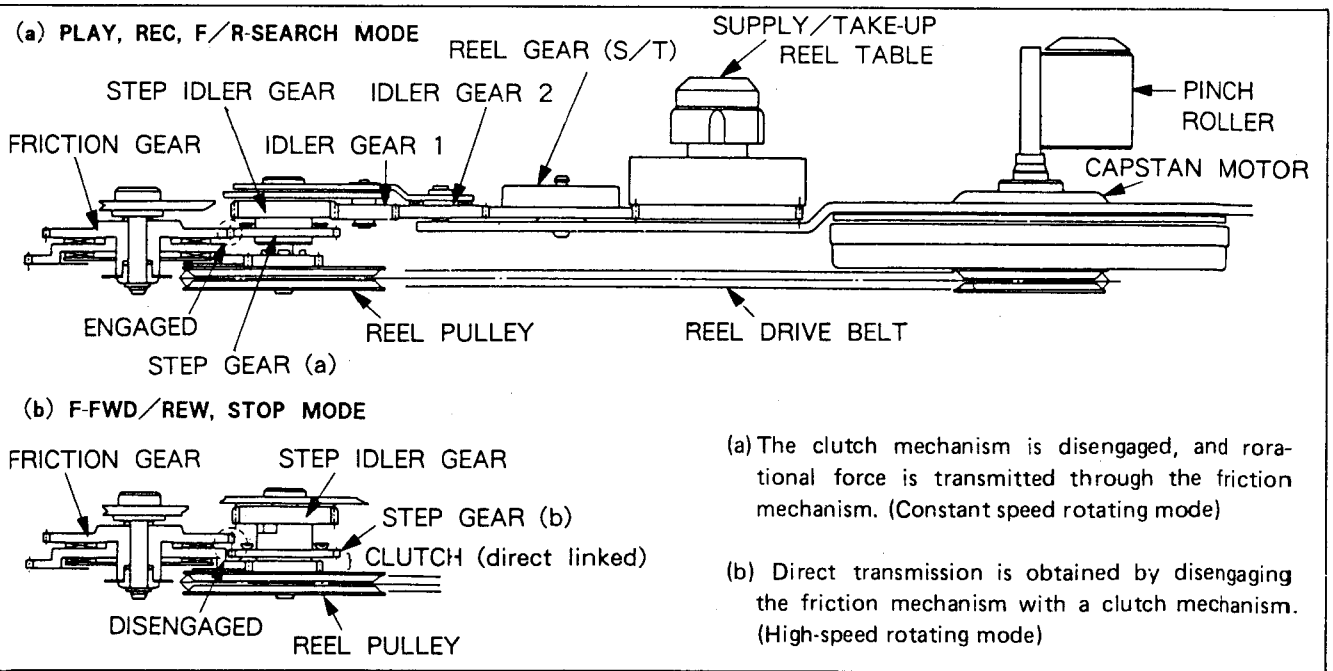


Fig. 2-11 REEL TABLE DRIVE

At that time, the reel table winding speed and the torque needed in a wide variety of modes are obtained by shifting the up and down STEP GEAR positioned at the upper section of pulley. The selection of the STEP GEAR is precision controlled by the MODE CAM GEAR via the BRAKE CONTROL SLIDE. With the up and down STEP GEAR down, the clutch mechanism is direct linked, and the transmission power from the capstan motor is sent to the reel table via IDLER GEAR assembly and REEL GEAR (S/T). On the other hand, FRICTION MECHANISM acts between the pulley and the STEP GEAR when the up and down STEP GEAR are in the elevated state, thereby controlling the transmission torque for generation of the take-up slip. Normally, it is desirable that the take-up torque of the reel table is higher in the R-SEARCH mode than that in the PLAY mode. This is because in the forward tape running the tape winding load to the HEAD DRUM has to be taken care of the capstan and the pinch roller.
While, in the reverse tape running mode the winding load has to be taken on the take-up reel table. In the special playback operation, a mechanism for varying the take-up torque of the reel table is required to be changed depending upon the running direction of the tape. But in this mechanism, the torque selection is made by varying the reduction speed ratio up to the reel table from the capstan motor on both the forward side and the reverse side of the tape. Also, design simplification of the selection mechanism is realized by using a single friction mechanism. In other words, the take-up torque necessary for forward/reverse rotation is obtained by controlling the capstan motor speed.

Rotation speed and torque needed for each mode of operation are converted by clutch mechanism for transmission of the drive power to the idler mechanism. The left and right moving IDLER GEAR assembly is automatically rotated to the left and the right according to the direction of capstan motor rotation by using the friction force. Because the mechanism is so designed as to drive the reel table of the side on which the tape is transported by the capstan and pinch roller, the forward and reverse constant speed drive (the PLAY, REC, F/R SEARCH modes) is carried out in the state in which the FRICTION MECHANISM is being operated (Fig. 2-12 ⓐ) On the other hand, in the condition in which the friction mechanism is not in operation, the forward/reverse high speed drive (FF/REW mode) is made possible (Fig. 2-12 ⓑ). Also, the reel drive in all modes is taken care of by the single left and right moving idler for design simplification.

The idler body employs gear drive to improve reliability with a view to realizing parts thinning while securing the transmission reliability. Using a resin molded gear as material of an idler, the efficiency of the entire reel drive system has been improved because there are no deformation and loss, and minimized rotation moving torque necessary for biting-in as in the case of a material such as rubber which shows considerable elastic deformation, etc. Further in this mechanism, an intermediate gear is provided in between the reel side and the idler to minimize the rotating and moving angle of the left and right moving idlers, thereby holding the reversing time to a minimum when shifting to the tape running direction change mode. This results in significantly reduced possibility of tape looseness.



(a) The clutch mechanism is disengaged, and rorational force is transmitted through the friction mechanism. (Constant speed rotating mode)

(b) Direct transmission is obtained by disengaging the friction mechanism with a clutch mechanism. (High-speed rotating mode)

Fig. 2-12 REEL TABLE DRIVE (SIDE VIEW)

2-3-2. Reel Table Drive Clutch Lock and Release Mechanism

As described in the preceding section, using the selection of the step gear (CLUTCH MECHANISM), two mechanisms which are driven by being selected via direct drive or via FRICTION MECHANISM from the capstan motor, to execute the reel table drive. The operating status of the clutch lock and the releasing mechanism is shown in Fig. 2-13.

Fig. 2-13 ① shows the tape unloading position (INITIAL position) when the power for the mechanism operating mode is switched off.

At that times all the levers are in the initial positions, and the clutch is released also so that a route for reel table drive is created via a friction mechanism.

Fig. 2-13 ② shows that the mechanism operation mode has executed the tape loading and that it has completed its movement to the STOP (stand-by), FF/REW position.

At this time, the CLUTCH ACT LEVER is operated by the hook of the ACT BRAKE SLIDE to move the ACT CLUTCH LEVER in the direction of arrow via the CLUTCH LEVER and the CLUTCH CHANGE LEVER. Now, the up and down STEP GEAR is placed into the direct coupled state. In the FF/REW mode, the reel table is directly driven so that the rotation of the capstan motor is directly transmitted to make high-speed rotation drive possible. When shifting the mode to the STOP from the FF/REW in this condition, the mechanism mode position is once moved back to the brake position, and when the reel table brake is instantaneously applied, the clutch is released once at the same time, after which it returns to the same mechanism mode as the FF/REW mode once again. Now, it is placed in a waiting state in the same condition of the STOP mode as shown in Fig. 2-13 ②.

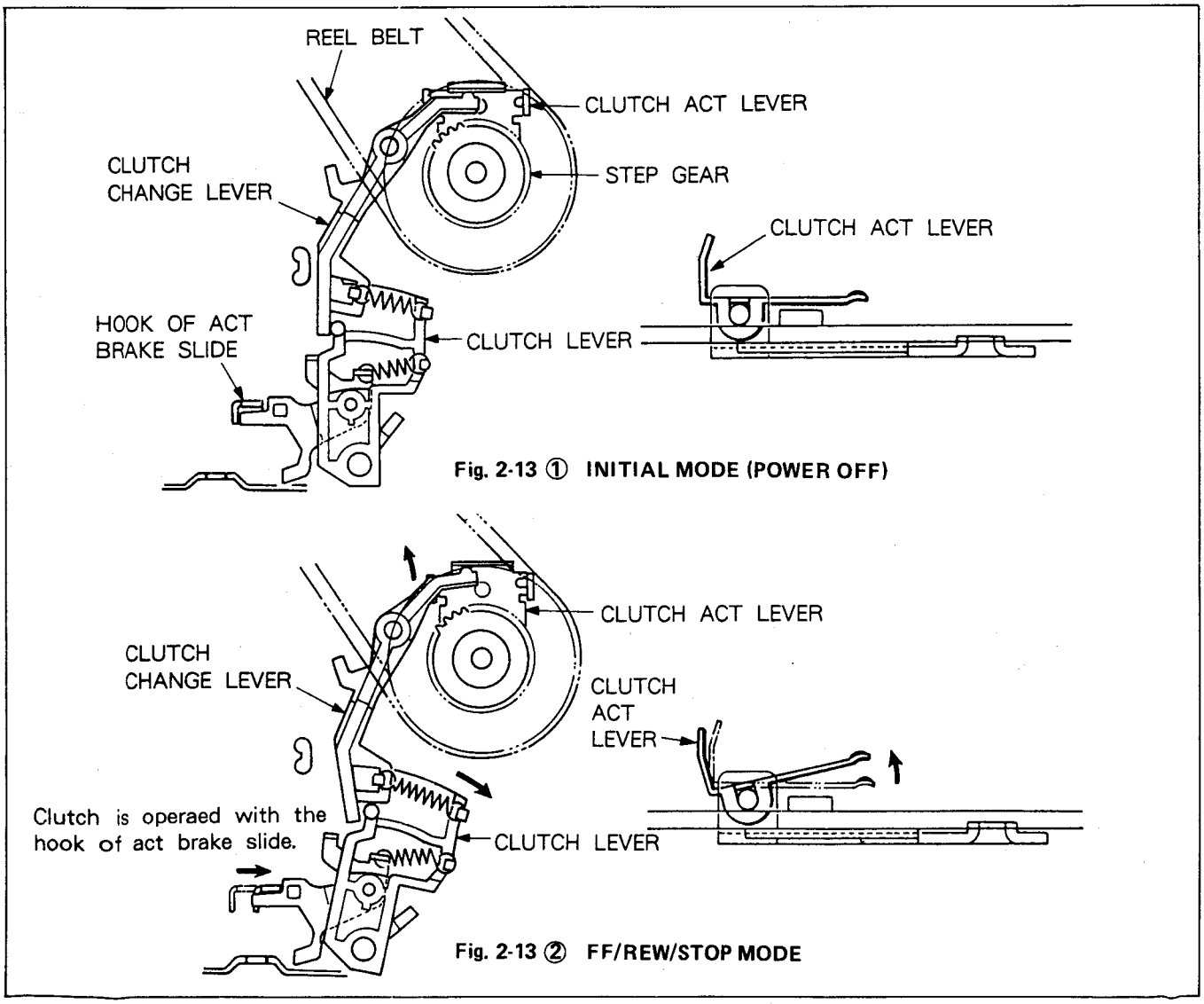


Fig. 2-13 ① INITIAL MODE (POWER OFF)

Fig. 2-13 ② FF/REW/STOP MODE

Fig. 2-13 ① – ③ REEL TABLE DRIVE CLUTCH LOCK AND RELEASE MECHANISM

Fig. 2-13 ③ shows the completion state of a shift to the PLAY mode via the STILL mode from the STOP (FF/REW) mode for the mechanism mode position.

In the case of this mode shifting, the movement of the BRAKE ACT SLIDE remains fixed. So, the CLUTCH ACT LEVER should be unlocked by the movement of the hook of the MAIN SLIDE PLATE to cause the clutch to be released. This movement in turn causes the capstan motor rotation to be transmitted via the friction mechanism. So, the constant speed rotation drive necessary for the PLAY (REC) mode and SEARCH mode is made possible.

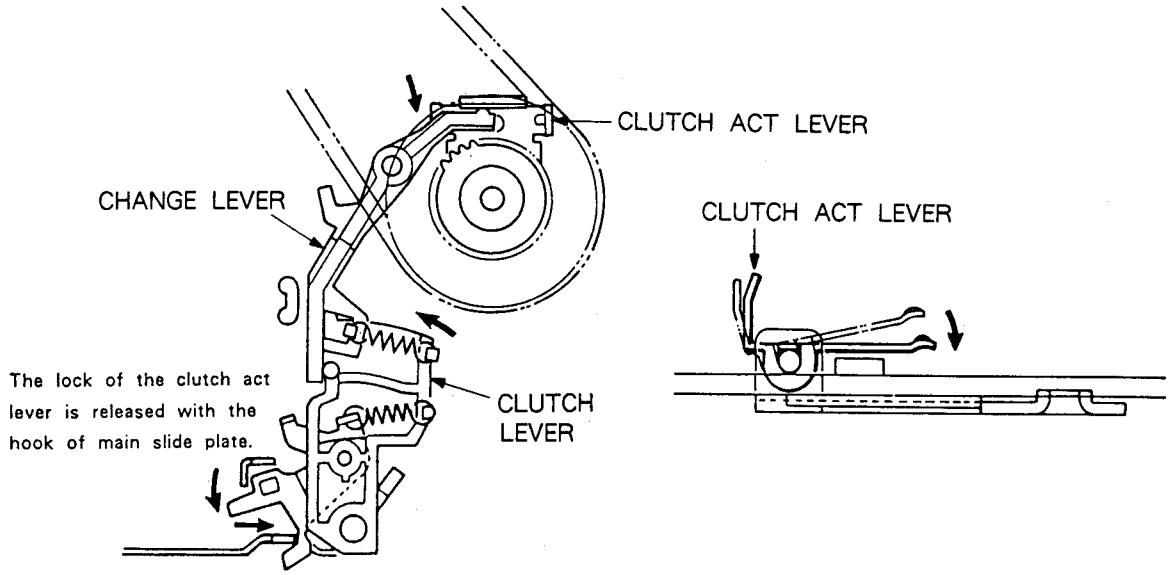

CLUTCH ACT LEVER
CHANGE LEVER
CLUTCH ACT LEVER
The lock of the clutch act lever is released with the hook of main slide plate.
CLUTCH LEVER

Fig. 2-13 ③ FF/REW/STOP MODE → STILL MODE → PLAY MODE

2-4. FRONT LOADING DRIVE SELECTION MECHANISM

In the P-90 mechanism, the motor dedicated to the use of front loading is not employed. The drive source is utilized instead of the tape loading motor. As shown in Fig. 2-14 ⓐ/ⓑ, during the front loading the FRONT LOAD WORM GEAR directly coupled to the tape loading motor axle and the FRONT HELICAL GEAR with several teeth missing are engaged with each other and rotated for transmission of the drive force to the front loading mechanism. When the cassette tape is inserted completely in the mechanism, the FRONT HELICAL GEAR is automatically disengaged from the FRONT LOAD WORM GEAR. After that, the tape loading operation is performed without the tape loading motor drive force being transmitted to the front loading mechanism.

While the drive force is being transmitted to the front loading mechanism, the CAM GROOVEs of the before-mentioned MAIN CAM GEAR and the MODE CAM GEAR are flat in cam line pattern. These are therefore held without changing the mode state of the mechanism in any way.

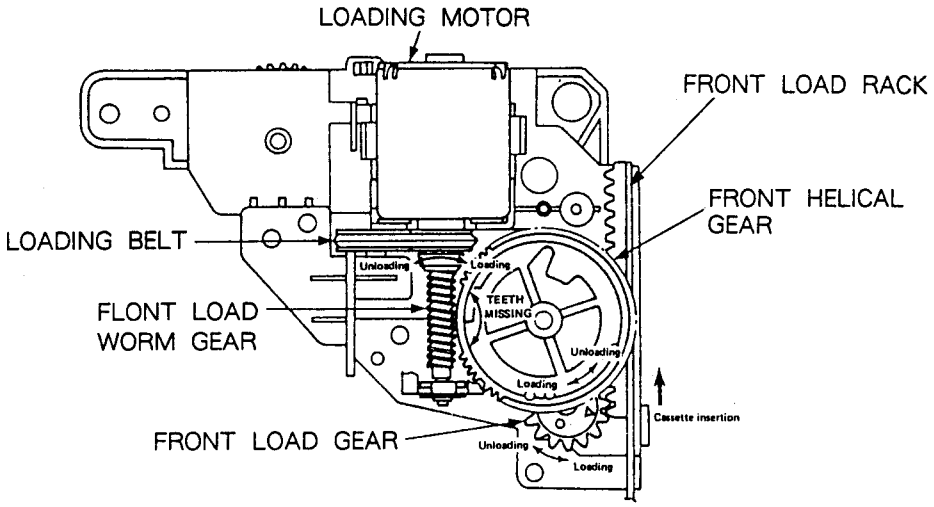


Fig. 2-14 ⓐ FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE INSERTED POSITION)

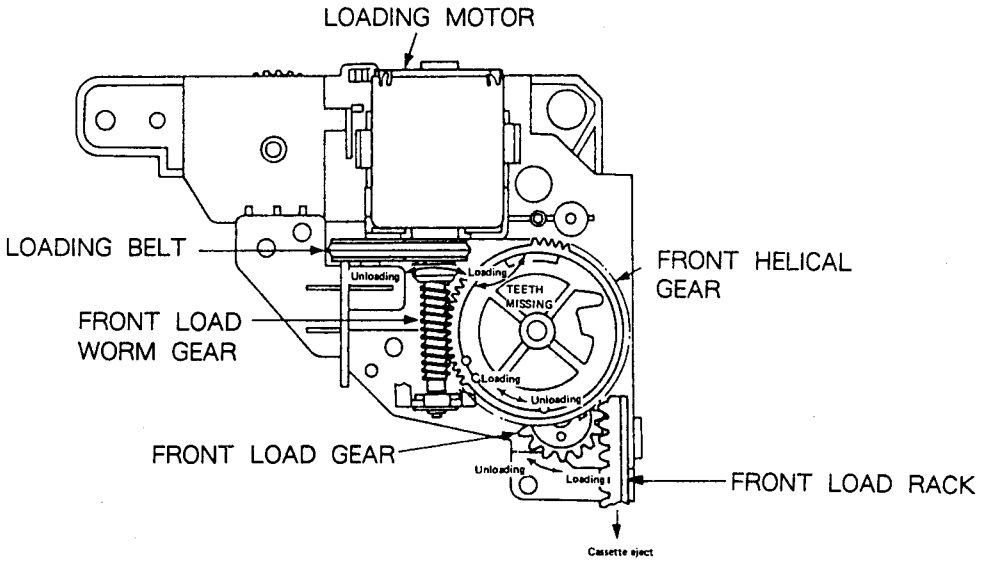


Fig. 2-14 ⓑ FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE EJECTED POSITION)

(A) Cassette inserting operation

When inserting a cassette from the cassette ejected state of Fig. 2-14 ⓑ, the FL START SWITCH shown in Fig. 2-15 is turned OFF, to cause the loading motor to be rotated in the direction of insetting. As a result, the FRONT LOAD RACK is drawn in, and the front loading is made up to the cassette tape completion point. So, it is locked in the grooves shown in Fig. 2-15 to complete cassette inserting. At that time, the FRONT HELICAL GEAR is positioned at ⓐ of Fig. 2-14, and is released from the front loading mechanism, therefore, the tape loading operation is continuously performed.

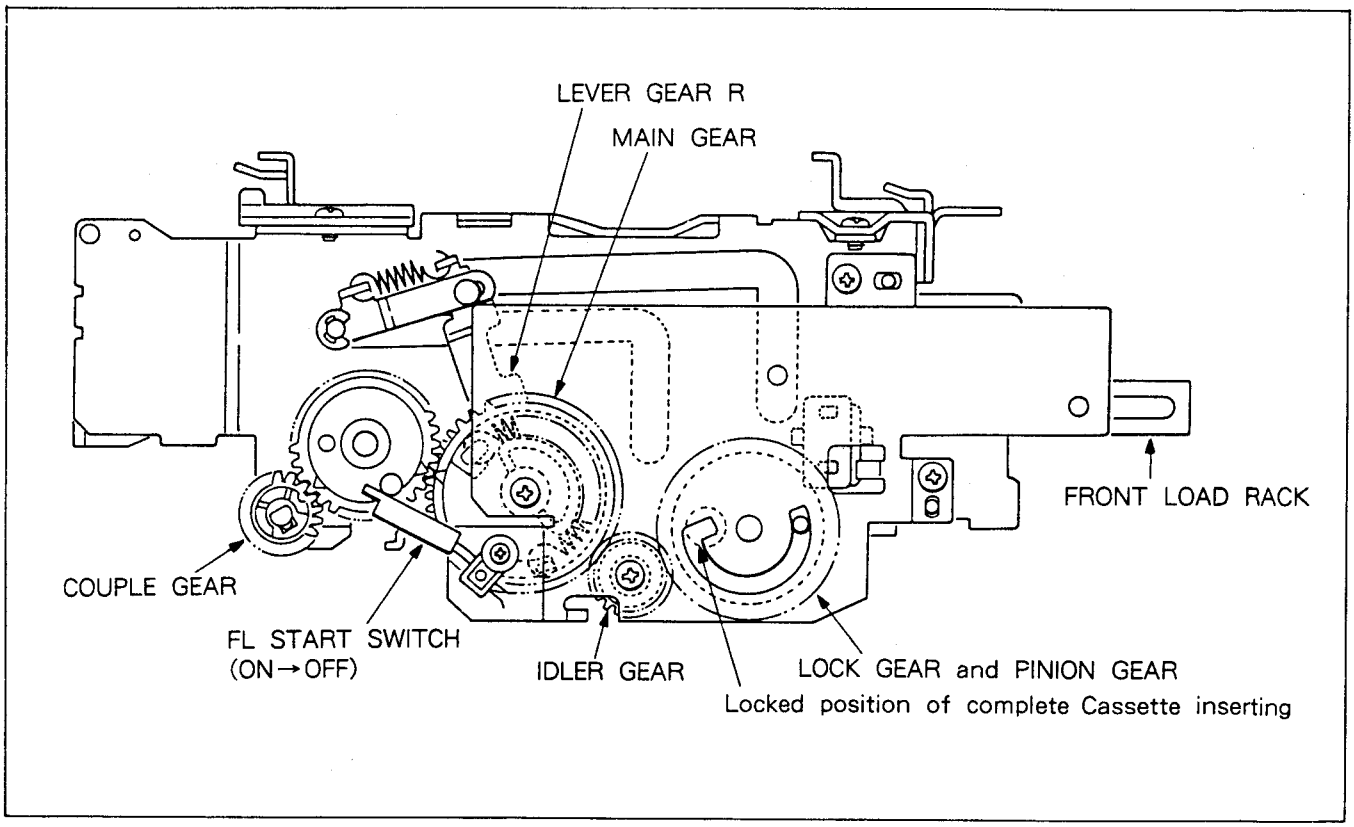


Fig. 2-15 CASSETTE HOLDER MECHANISM (CASSETTE INSERTING OPERATION)

(B) Cassette ejection operation

The components of the front loading mechanism is shown in Fig. 2-16.

When ejecting the cassette from the inserted state shown in Fig. 2-14 ⓐ, the FRONT ACT LEVER is pushed in the direction of arrow due to the ACT SLIDE PLATE moves in the direction of arrow shown in Fig. 2-17. As a result, the FRONT LEVER assembly is turned counterclockwise via the FRONT LOAD SLIDE to cause the FRONT HELICAL GEAR to be engaged with the FRONT LOAD WORM GEAR of the loading motor. At that time, the loading motor is being rotated counterclockwise, so that the FRONT HELICAL GEAR is caused to be rotated counterclockwise also to carry out the front unloading via the FRONT LOAD GEAR and the FRONT LOAD RACK. At the same time, the FRONT ACT LEVER is operated counterclockwise by the hook of the FRONT HELICAL GEAR. This releases the lock being pushed in the direction of arrow indicated by the ACT SLIDE PLATE. So, the FRONT LOAD SLIDE assembly now moves to the initial position to prepare for the next ejection operation. Incidentally, the movement of the FRONT LEVER assembly performs an important function of positioning the FRONT HELICAL GEAR (Fig. 2-14 ⓐ) upon completion of cassette mounting, in addition to the cassette eject start-up operation.

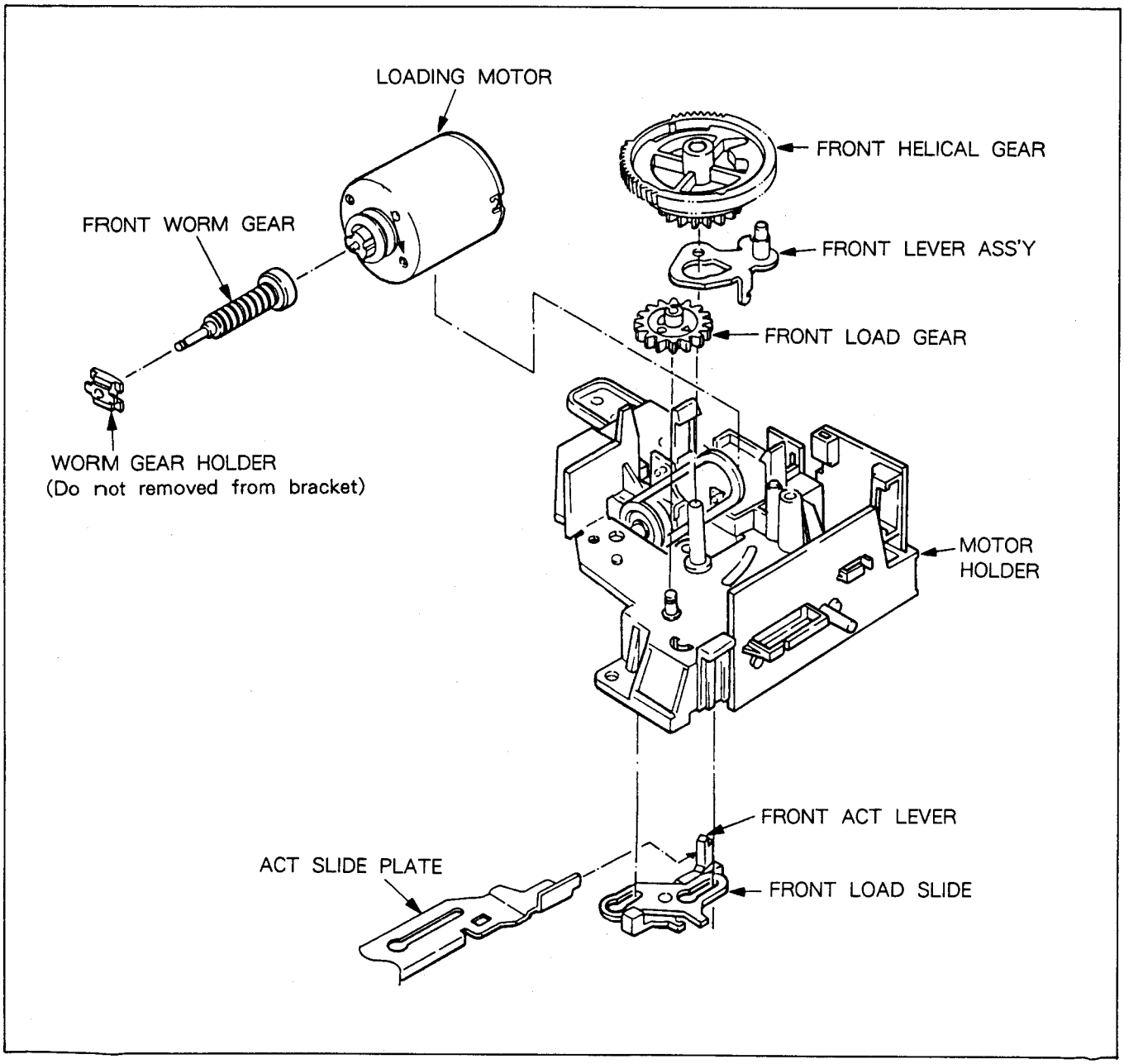


Fig. 2-16 FRONT LOADING DRIVE SELECTION MECHANISM

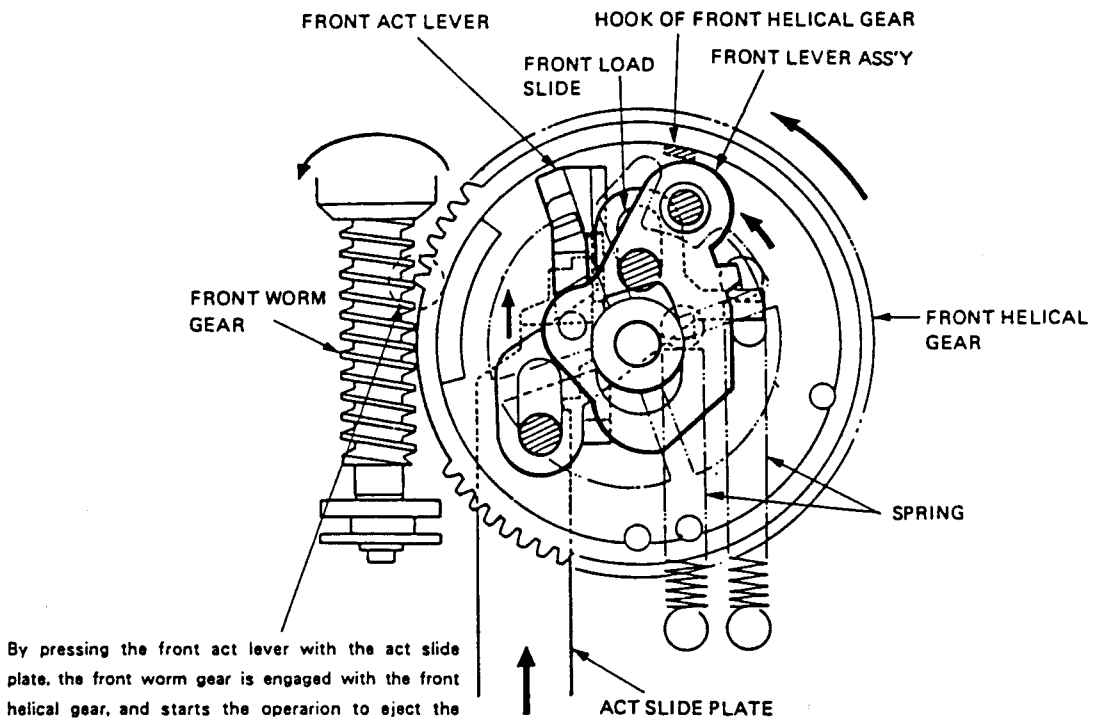

FRONT ACT LEVER
HOOK OF FRONT HELICAL GEAR
FRONT LOAD SLIDE
FRONT LEVER ASS'Y
FRONT WORM GEAR
FRONT HELICAL GEAR
SPRING
ACT SLIDE PLATE
By pressing the front act lever with the act slide plate, the front worm gear is engaged with the front helical gear, and starts the operarion to eject the cassette.

Fig. 2-17 CASSETTE EJECTION START OPERATION (See through top view)

2-5. CASSETTE HOLDER MECHANISM

2-5-1. Components

The exploded view of the cassette holder mechanism is shown in Fig. 2-18. This mechanism consists of a cassette tray for feeding the cassette tape to the specified position of the mechanism chassis, a side plate provided with L type holes for supporting and guiding it, the top plate for regulating the width of left and right, and a group of gears for driving the cassette tray.

The entire mechanism is of independent construction apart from the mechanism body. The holder is fixed on the mechanism chassis by inserting the pawls at two points and tightening the setscrews at two points, or at a total of four points.

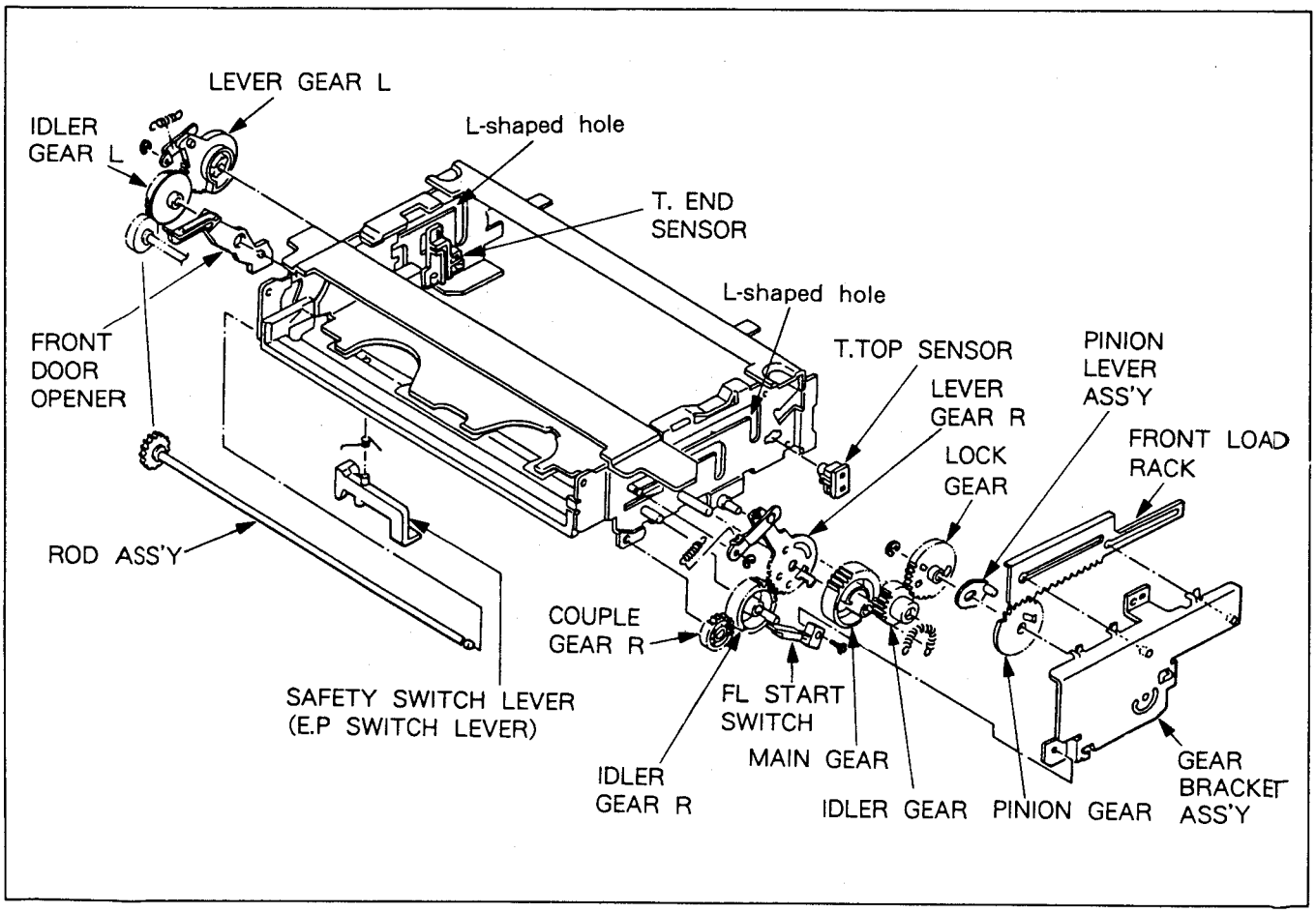


Fig. 2-18 EXPLODED VIEW OF THE CASSETTE HOLDER MECHANISM

2-5-2. Description of Cassette Holder

The cassette holder is of motor-less design, as the lowering of mechanism height and driving source are done by the loading motor of the mechanism body.

As a substitute for the worm gear system hitherto used in the major drive section for the drive selection mechanism mentioned in section 2-4., the RACK LOADING system is adopted in this cassette holder mechanism. By this mechanism the motor-less design can be realized. An exploded view of the mechanism is shown in Fig. 2-19. A description of the operation is made below along with Fig. 2-19.

To press-fit the cassette tape after sending it onto the mechanism chassis, the PINION GEAR section is triple construction. The FRONT LOAD RACK side and the IDLER GEAR side are independently engaged. The PINION GEAR and the LOCK GEAR are connected from the PINION LEVER PIN riveted to the PINION LEVER. Even after feeding the cassette tape to the specified position of the mechanism chassis, the FRONT LOAD RACK slides, giving the rotation to the PINION GEAR which is engaged with the FRONT LOAD RACK. At that time, a pin is dropped into the groove section provided on the GEAR BRACKET ASS'Y.

The other LOCK GEAR is fixed by this PINION LEVER PIN, and the cassette tape is press-fitted onto the mechanism chassis by linked IDLER GEAR. The before-mentioned FRONT LOAD RACK and the PINION GEAR are set free after dropping the PINION LEVER PIN into the groove section. So, the drive force of the loading motor is sent to the mechanism body.

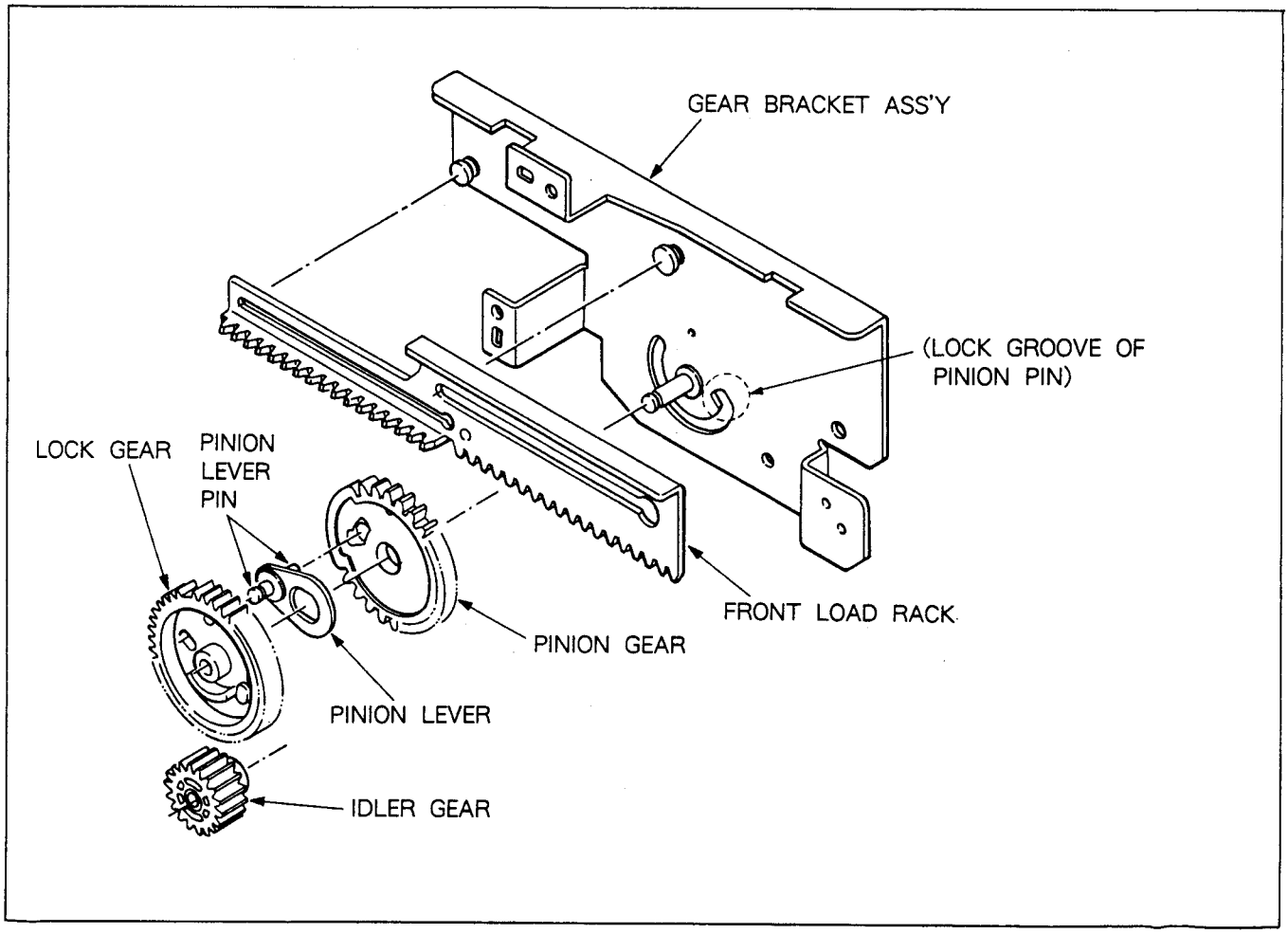


Fig. 2-19 RACK LOADING MECHANISM OF CASSETTE HOLDER

3. MECHANISM CONTROL

3-1. MODE ARRANGEMENT

This mechanism is arranged in such a mode layout as shown in Table. 3-1 and as described in section 2-1. The mode sensing switch described below is used for control of these modes.

3-2. MODE DETECTION SWITCH

For mode detecting one leaf switch (FL START SWITCH and one rotary switch (MECHANISM MODE SWITCH) are used in combination.

Mechanism Mode	Mechanism Mode Switch 3	2	1	HEX DATA	Function	Main Mode Shifting Conditions	VTR Operation Mode
EJECT	–	–	–		Eject position	Detected by FL start switch	EJECT
					Front loading/Unloading	← Cassette insertion through STOP or PLAY mode STOP from EJECT →	
SHORT REW	–	–	–		Take up operation in the tape end position	← Pre-rolling after detecting tape end with tape end sensor.	Low side of ⑥. Sensed upon IN
INITIAL	1	1	1	⑦	Power off position	Power ON↔OFF when the cassette is inserted completely. OFF	Power off when tape is loaded completely
					Tape unloading position Tape loading Tape loading ending position	From PLAY to STOP From FF/REW to STOP	
BRAKE	0	0	1	①	Main brake applying position		
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)	ON	STOP, FF/REW
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.	From SLOW to STOP (or STILL) From FF to F-SEARCH From F-SEARCH to FF PLAY↔STILL	STILL, SLOW, F-ADV
PLAY	1	0	0	④	From FWD direction Normal running mode		PLAY, REC, F-SEARCH
IDLER	1	0	1	⑤	Forward/reverse changeover position	PLAY↔R-SEARCH From REW to R-SEARCH From R-SEARCH to REW	PAUSE
REV	1	1	0	⑥	From REV direction Normal running mode		R-SEARCH

Table 3-1

(1) Switch component
The mode switch consists of FL START SWITCH for detecting the cassette ejection and insertion, and MECHANISM MODE SWITCH for detecting the each mode position of the mechanism. As can be understood from Fig. 3-1, the MECHANISM MODE SWITCH rotates in excess of 360 degrees. Therefore, the sensing of a signal from the MECHANISM MODE SWITCH is done by the leaf switch.
In the P88 and P89 mechanisms, incidentally, short REW position is detected by the FL END SW, but in the P90 mechanism, the FL END SWITCH is not required due to a change in the internal structure of the MECHANISM MODE SWITCH.

(2) Mechanism mode switch
The mechanism mode switch consists of four terminals, namely, COM, DATA1, DATA2, and DATA3. These are processed as 3-bit signals for discrimination of seven modes.
The MECHANISM MODE SWITCH is not interchangeable with the hither to available black switch due to a change in its internal structure. Be sure therefore to use a blue switch.

3-3. CONSIDERATION TO FULL LOADING

① In the normal stop condition, the head drum is rotated to facilitate the start-up of the image at the time of playback, but it is conceivable that this is left undisturbed for an extended period of time. This may result in wear of the video head. For this reason, when five minutes elapse from the stop condition, the head drum stops rotating.

② To prevent the tape from being caught in the head drum due to dew forming, etc., the tape is housed in the unloaded cassette when turning the power off.

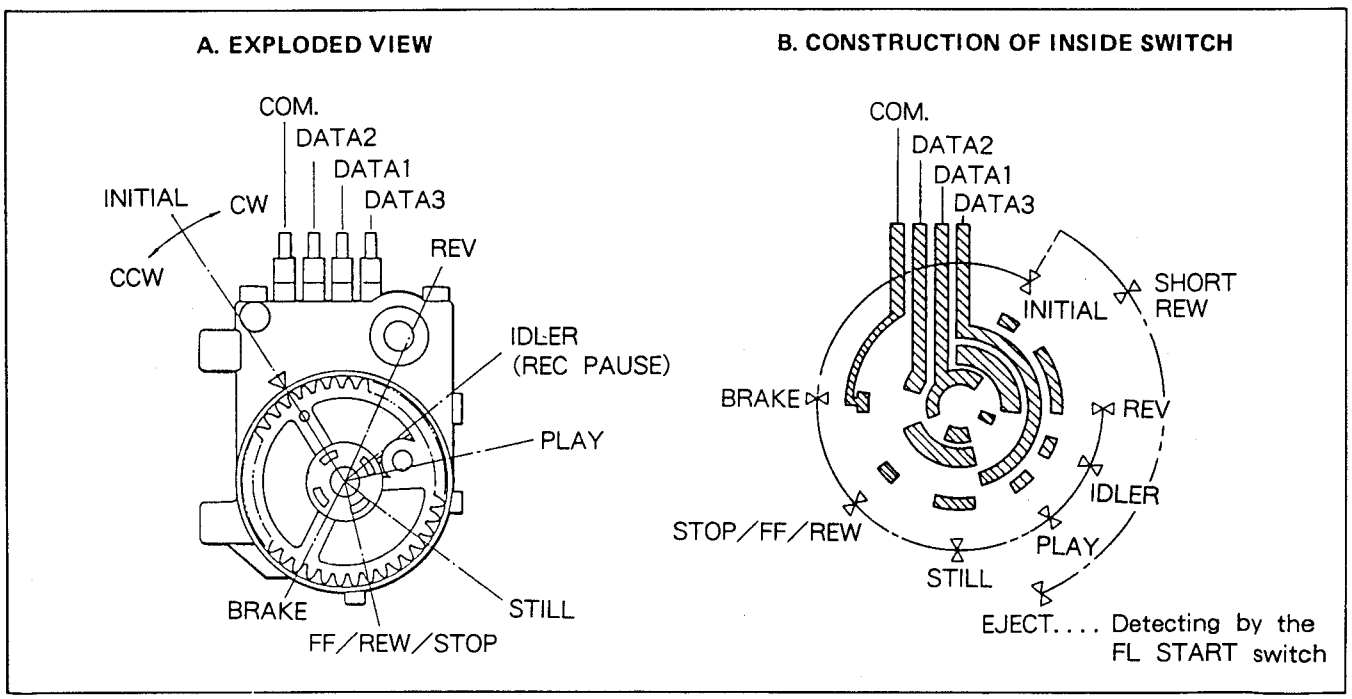


Fig. 3-1 MECHANISM MODE SWITCH (ROTARY SWITCH)

4. MECHANISM MAINTENANCE AND CHECKING

4-1. PERIODIC CHECKING AND MAINTENANCE ITEMS AND SERVICE JIGS

The following maintenance and periodic checking procedures are recommended to ensure proper operation, and to protect the tape from dirt and damage. Also, these procedures should always be followed after repairing the unit.

4-1-1. Periodic Check Items

○ Cleaning ◎ Confirmation △ Lubrication

Part \ Usage Time (hours)		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	Remarks
Tape Guide System	Tape running surfaces	○	○	○	○	○	○	○	○	○	○	
	ACE head	○	○	○	○	○	○	○	○	○	○	
	Drum (cylinder)	○	○	○	○	○	○	○	○	○	○	Head life depends heavily on operating conditions.
Drive System	Loading belt	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Reel drive belt	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Intermediate gear, pulley axles		△		△		△		△		△	Absolutely avoid oil on tape running surfaces.
	Capstan axles		△		△		△		△		△	
	Loading motor		◎		◎		◎		◎		◎	
Performance Check	Back tension torque		◎		◎		◎		◎		◎	47 ± 5 gcm
	Brake system		◎		◎		◎		◎		◎	
	FF, REV, PLAY torque		◎		◎		◎		◎		◎	FF : 600 gcm and over REW : 750 gcm and over REV : 150 to 240 gcm PLAY : 100 to 160 gcm

Note: The back tension torque is the value that has been measured by the cassette torque meter (Back tension, REW: VHT-063S) (REV: VHT-404S).
The torque of FF, REV, REW, and PLAY represent those measured with them locked by the torque gauge.
FF and REW are values 2 seconds after starting.
Torque Tape: VHT-063S (J-6082-066-A)
VHT-404S (J-6082-067-A)

4-1-2. Cleaning

① Drum (COMPL CYLINDER) and Video Heads (See Fig. 4-1-1.)

1) Wrap a chamois leather around your finger and moisten it with methyl alcohol.
2) Move the chamois leather to left and right several times on the video head to clean. There is a video head also on the opposite side, so clean it likewise. In Hi-Fi models, clean the audio head also.
3) Clean the tape path surface of the cylinder in the same way.

Note : Always turn power off before cleaning. Do never move the chamois leather vertically or apply too much force to the head ; it may be damaged.

② Cleaning of the Tape Guide System (See Fig. 4-1-2.)

1) Set the EJECT mode and clean the tape guide system (tape guides, impedance roller, FTE head, ACE head, pinch rollers, capstan axles, etc.) with a chamois leather moistened with methyl alcohol.

Note : Make sure that no oil, grease, etc. adhere to the chamois leather and that heads are not damaged.

③ Cleaning of the Drive System

1) Clean the drive system (loading belt, reel drive belt, pulley, supply reel table, etc.) with a soft cloth moistened with methyl alcohol.

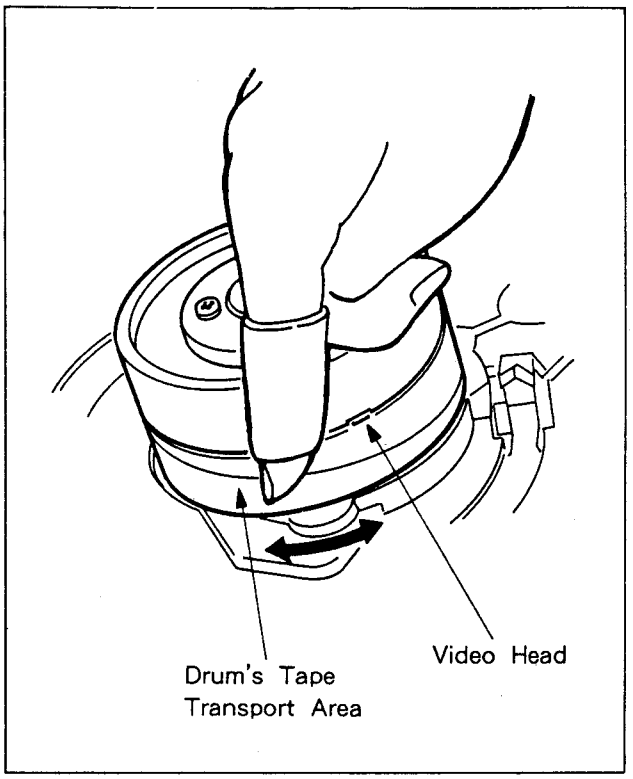


Fig. 4-1-1.

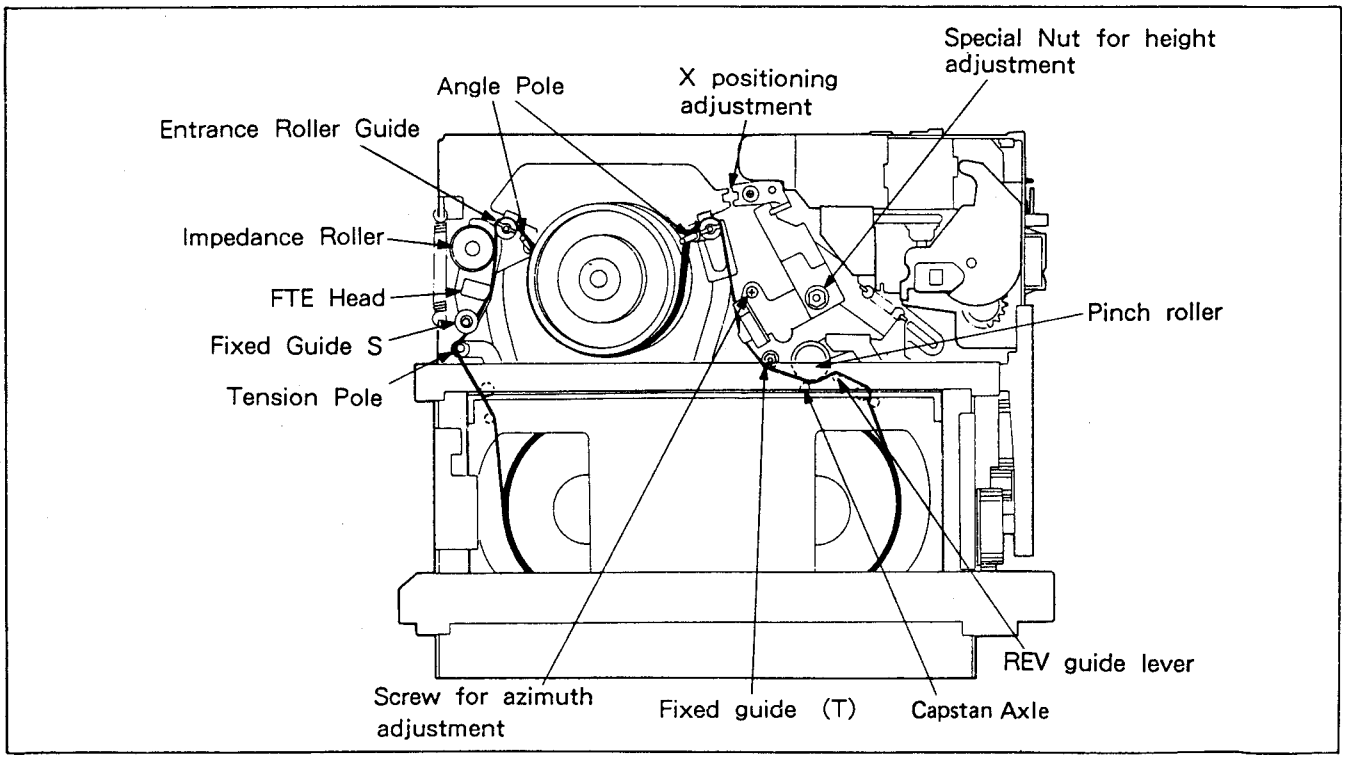
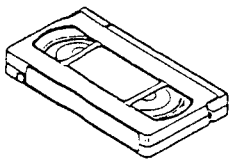


Fig. 4-1-2. Cleaning

4-1-3. Service Jigs

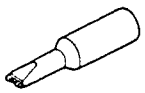
No.	Jig	Jig No.	Remarks
1	Alignment tape (PAL)	H-7099-052-H	PAL-NORMAL
2	Eccentric screwdriver (VHJ-0003)	J-6082-044-A	For tape path adjustment
3	Nut box (VHJ-0048)	J-6082-045-A	For tape path adjustment
4	Torque gauge	H-7099-039-H	For reel take-up torque measurement
5	Torque gauge adapter	H-7099-035-H	For reel take-up torque measurement
6	Fixed guide height gauge (VHJ-0053)	J-6082-052-A	For fixed gaude (S) height adjustment
7	Torque gauge screwdriver (VHJ-0014)	J-6082-047-A	For screw fastening torque adjustment
8	3mm dia. bit for torque screwdriver (VHJ-0045)	J-6082-048-A	Spare bit for the torque gauge screwdriver
9	Video head removing tool (VHJ-0041)	J-6082-049-A	For upper drum removal
10	Mode selector (VHJ-0050)	J-6082-050-A	For mechanism mode selection
11	Master plane	H-7099-279-H	Reel table height
12	Reel disc height jig	H-7099-038-H	Reel table height
13	Mode selector relay board (VHJ-0075)	J-6090-008-A	Relay board for mode selector
14	PAL torque cassette (VHT-063S) (PAL)	J-6082-066-A	For back tension torque
15	26-pin flexible flat cable (VHJ-0064)	J-6090-006-A	Spare cable for mode selector
16	7-wire flat cable (VHJ-0076)	J-6090-009-A	Spare cable for relay board
17	REV guide lever removing tool (VHJ-0073)	J-6090-007-A	For REV guide lever removal

H-7099-052-H



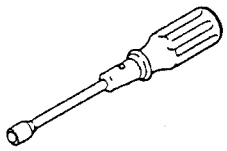
No. 1

J-6082-044-A (VHJ-0003)



No. 2

J-6082-045-A (VHJ-0048)



No. 3

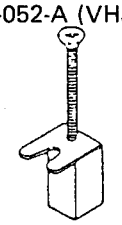
H-7099-039-H

No. 4

H-7099-035-H

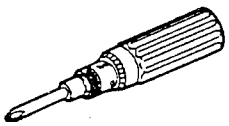
No. 5

J-6082-052-A (VHJ-0053)



No. 6

J-6082-047-A (VHJ-0014)

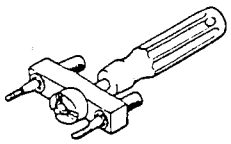


No. 7

J-6082-048-A (VHJ-0045)

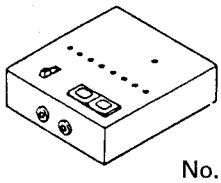
No. 8

J-6082-049-A (VHJ-0041)



No. 9

J-6082-050-A (VHJ-0050)

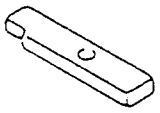


No. 10

H-7099-279-H

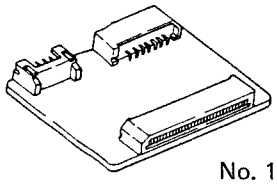
No. 11

H-7099-038-H



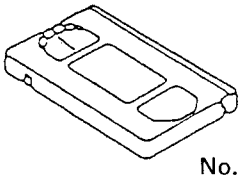
No. 12

J-6090-008-A (VHJ-0075)



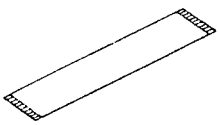
No. 13

J-6082-066-A



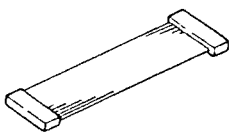
No. 14

J-6090-006-A (VHJ-0064)



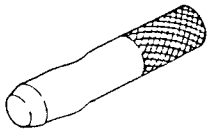
No. 15

J-6090-009-A (VHJ-0076)



No. 16

J-6090-007-A (VHJ-0073)



No. 17

4-2. MODE SELECTOR (VHJ-0050) HANDLING INSTRUCTIONS

The mode selector drives the loading motor of the P88 mechanism with its internal batteries (UM-2 × 4 = 6V), using LEDS to indicate the mode (EJECT, INITIAL, BRAKE, STOP/REW/FWD, STILL, PLAY, IDLER, REV) simultaneously with EJECT⇔REV mode changes.
Instead of the internal batteries, an external DC 6V power supply can also be used.

4-2-1. Part Names (See Fig. 4-2-1)

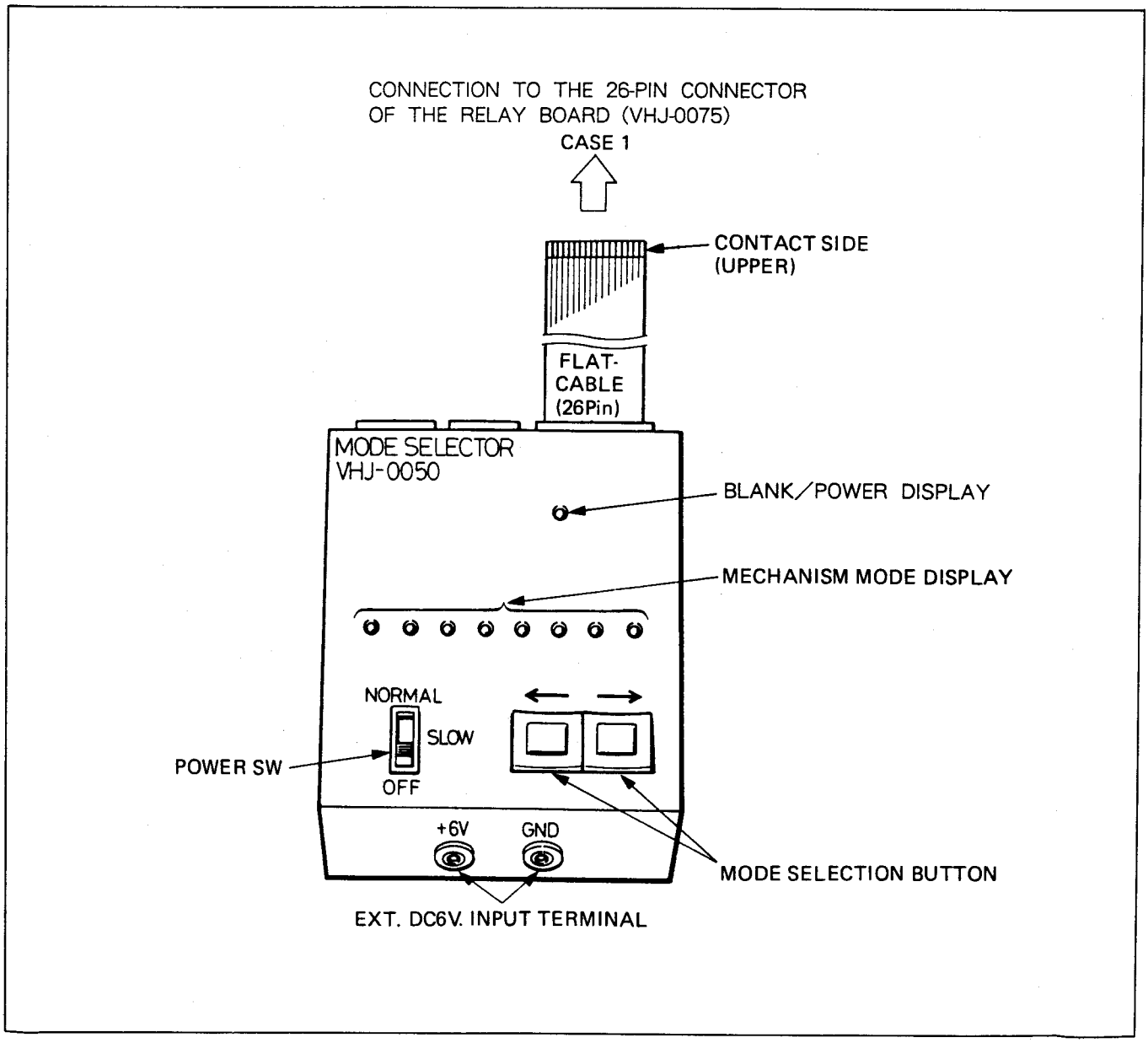


Fig. 4-2-1

4-2-2. Connection Method (See Fig. 4-2-2)

1) Remove the 7-wire cable connected from the system control circuit to the connector (CN822) of the MC-3 board.
2) Connect the 7-wire cable (VHJ-0076) between the connector (CN822) of the MC-3 board and the 7-pin connector of the Mode Selector Connection Board (VHJ-0075).
3) Remove the 6-wire cable extending from the cassette holder section from the connector of the System Control Circuit Board and connect it to the 6-pin connector of the Mode Selector Connection Board (VHJ-0075).
4) Connect a supplied 26-pin flat cable (VHJ-0064) of the mode selector (VHJ-0050) between the mode selector body and the 26-pin connector of the Connection Board (VHJ-0075).

Note : Care should be taken to avoid mistaking the direction of the contacting side when connecting a flexible flat cable.

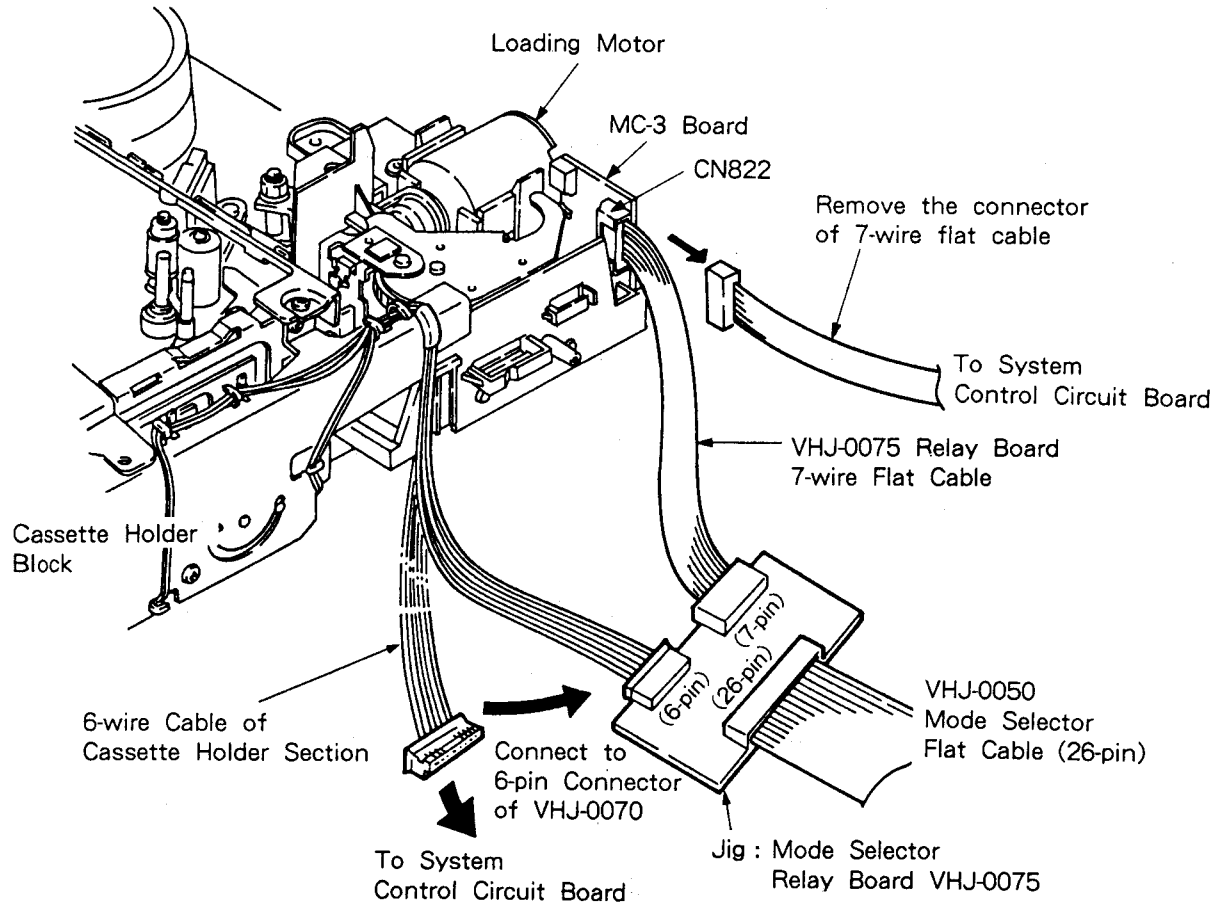


Fig. 4-2-2 Connection

4-2-3. Handling Method

1) Keep the right side (⇨) of the mode selector key pressed, and the mode will change in the following sequence : EJECT⇨INITIAL⇨BRAKE⇨STOP/REW/FWD⇨STILL⇨PLAY⇨IDLER⇨REV.
2) When changing the mode in the REV···⇨EJECT direction, press the left side (⇦) of the mode selector key until the desired mode is indicated.
3) In the mid position of each mode during a shift to other mode, the "BLANK" LED lights. But the "PLAY", "IDLER", "REV" LEDs light between the EJECT mode and the INITIAL mode. Be sure therefore to check the mechanism body to see just what state the mechanism is in.
   Incidentally, if the mode selector is not connected to the mechanism, the "BLANK" LED lights to indicate the power ON.
4) The SLOW position of POWER switch makes relatively slow motions in comparison with the NORMAL position.

Note 1 : The mode selector drives the loading motor only, not affecting the head drum motor and the capstan motor. When using the mode selector with a cassette loaded, turn the capstan motor manually to remove tape slackness, preventing tape entanglement.

Note 2 : If the left side (⇦) of the mode selector (VHJ-0050) key is kept pressed with the COMPL cassette mechanism removed, it might get past the EJECT position, causing the front helical gear and the front worm gear to get disengaged.
In this condition, since the front helical gear will not turn even if the right side (⇨) of the mode selector key is pressed, rotate (push) the front helical gear clockwise by hand and engage it with the front worm gear. In this condition, as there is a misalignment between the mechanism main body operation mode (indicated by the mode selector indicator lamps) and the front loading mechanism operation mode, keep the right side (⇨) of the mode selector key pressed until the front helical gear and the front loading gear of the front loading mechanism get back to the initial condition (Refer to A and B in Fig. 4-5-5 of section 4-5-2. Loading Motor).
When the front loading mechanism returns to the initial condition, operation mode of the whole mechanism gets back to normal, matching the mode shown by the mode selector indicator lamps (mode is not properly indicated, however, during EJECT to INITIAL).
Sometimes, engagement of the front helical gear with the front worm gear is delayed, operation mode of the mechanism main body gets too much ahead and the front loading mechanism mode cannot be switched to the initial condition. In that case, press the left side (⇦) of the mode selector key, setting the mechanism main body operation mode back to EJECT (rotation of the mode cam and the MAIN CAM stops).

Note 3 : The mode selector indicator lamps show the mechanism operation mode, but the EJECT lamp may sometimes fail to indicate the actual mechanism operation mode.

5. MECHANISM DISMANTLING AND REASSEMBLING

5-1. MECHANISM MAIN UNIT (See Fig. 5-1-1.)

1. Removal

1) Remove the connectors of the COMPL MC-3 and the COMPL HEAD BRACKET.
2) Remove the flexible cable ① connecting the COMPL CYLINDER to the PRE-AMP UNIT ③ (See Fig. A).
3) Remove the two screws ②, then remove the PRE-AMP UNIT ③.
4) Remove the screw ④, then remove the PRE-AMP. BRACKET ⑤.
5) Remove the two screws ⑥.
6) Remove the three screws ⑦ and two screws ⑩, then lift up the mechanism main unit and remove it.
   Since the TRAY ⑧ obstructs removal of the two front screws ⑩, move the TRAY LOCK LEVER ⑨ in the direction of the arrow to unlock, then slide the TRAY ⑧ before removing the screws. (See Fig. B)

Note : Shape of the PRE-AMP UNIT ③ and the PRE-AMP. BRACKET ⑤ differ depending on the model.

2. Remounting

1) Mount the mechanism main unit onto the chassis with the three screws ⑦ and two screws ⑩.
2) Tighten the two screws ⑥.
3) Mount the PRE-AMP. BRACKET ⑤ with the two screws ④.
4) Mount the PRE-AMP UNIT ③ and the ground lug with the two screws ② (some models are not provided with a ground lug).
5) Insert the flexible cable ① into the connector of the PRE-AMP UNIT.
6) Connect the connectors of COMPL MC-3 and COMPL HEAD BRACKET.

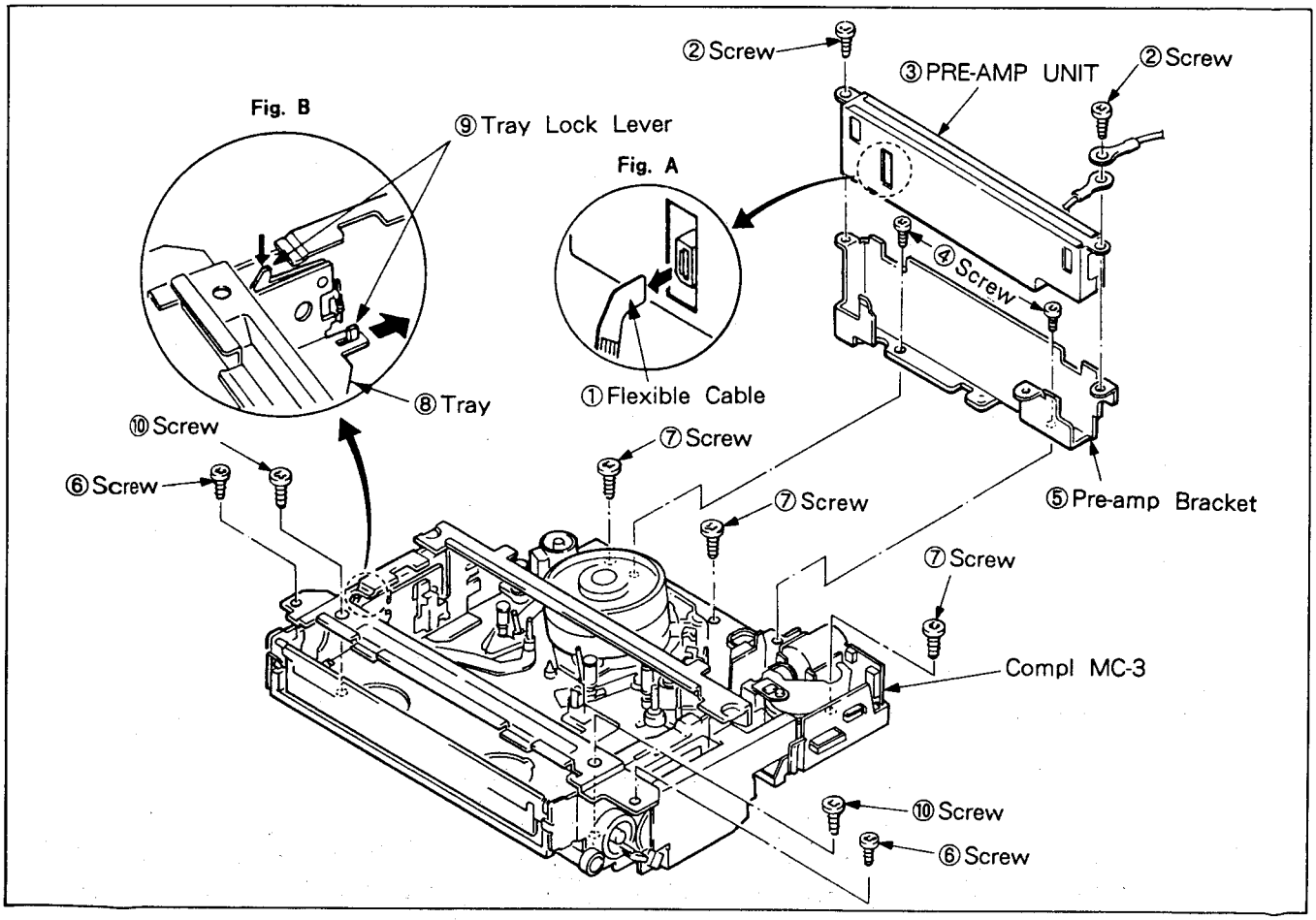


Fig. 5-1-1 Mecahnism Main Unit

5-2. CASSETTE HOLDER MECHANISM

5-2-1. COMPL Cassette Mechanism (See Fig. 5-2-1.)

1. Removal

1) Set the video main unit to the EJECT completed mode.
2) Pull out the connectors (6-PIN CONNECTOR connected to the system control circuit board, ACE HEAD CONNECTOR, and FTE HEAD CONNECTOR) from CASSETTE HOLDER.
3) Remove the two screws ①.
4) Remove the two screws ②.
5) Lift up the COMPL CASSETTE MECHANISM ④ back a little and remove the two hooks ③ on the front (See Fig. B). When doing so, make sure that the SAFETY SWITCH LEVER is not caught by the mechanism chassis.

2. Remounting

1) Set the chassis section mechanism to the EJECT mode with the mode selector (VHJ-0050) (looking from above, match the front loading gear hole ⑤ with the MOTOR HOLDER hole ⑥ as shown in Fig. A).
2) Set the COMPL CASSETTE MECHANISM ④ to the EJECT completed mode.
3) Mount the COMPL CASSETTE MECHANISM ④ onto the mechanism chassis, aligning it with the protuberance.
   Match positions of the FRONT LOADING GEAR △ mark ⑦ and the RACK EJECT mark ⑧. (See Fig. A.)
4) Fix to the mechanism chassis with the two screws ②.
5) Fix to the chassis with the screw ①.
6) Connect to the various connectors.

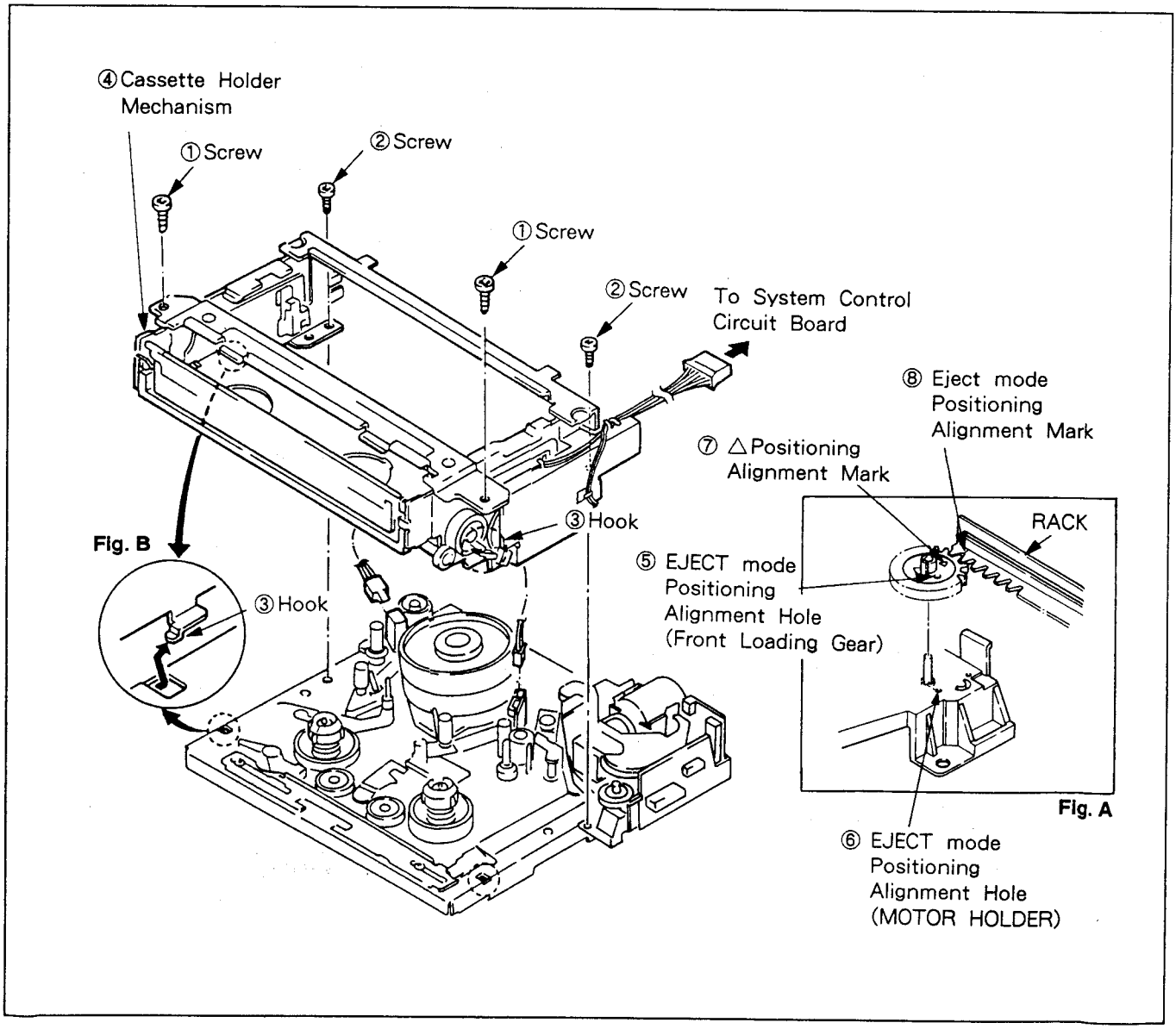


Fig. 5-2-1 Compl Cassette Mechanism

5-2-2. Gear Bracket Ass'y (See Fig. 5-2-2.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the four screws ①, then remove the GEAR BRACKET ASS'Y ②.
3) Remove the E ring ③, then remove the LOCK GEAR ④, the PINION LEVER ASS'Y ⑤, the PINION GEAR ⑥ and the RACK ⑦, in that order.

2. Remounting

1) Apply grease to the shaft ⑧ and the two pins ⑨ of the GEAR BRACKET ASS'Y.
2) Apply grease to the pin ⑩ of the PINION LEVER ASS'Y.
3) Apply grease to the toothed part of the RACK ⑦.
4) Fit the RACK ⑦ onto the two pins ⑨. Match position of the hole ⑪ to the GEAR BRACKET hole ⑫.
5) Mount the PINION GEAR ⑥, PINION LEVER ASS'Y ⑤, and LOCK GEAR ④ in the shaft ⑧ in the order mentioned.
   Set the hole ⑬ of the PINION GEAR and the LOCK GEAR with the hole ⑪ of the RACK for proper positioning at that time.
6) Mount them in E-ring shaft.
7) Set the GEAR BRACKET ASS'Y ② to the dowel and mount it using four screws ①.
   Set the hole Ⓐ of the IDLER GEAR with the hole Ⓑ of the SIDE BOARD as shown in Fig. 5-2-3 at this time.
   Also set the hole ⑬ of the PINION GEAR and the LOCK GEAR with the hole ⑫ of the GEAR BRACKET by referring to Fig. 5-2-2. After mounting them, check to be sure that FL START SWITCH ⑭ is in the ON state shown in Fig. A.
8) Remount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

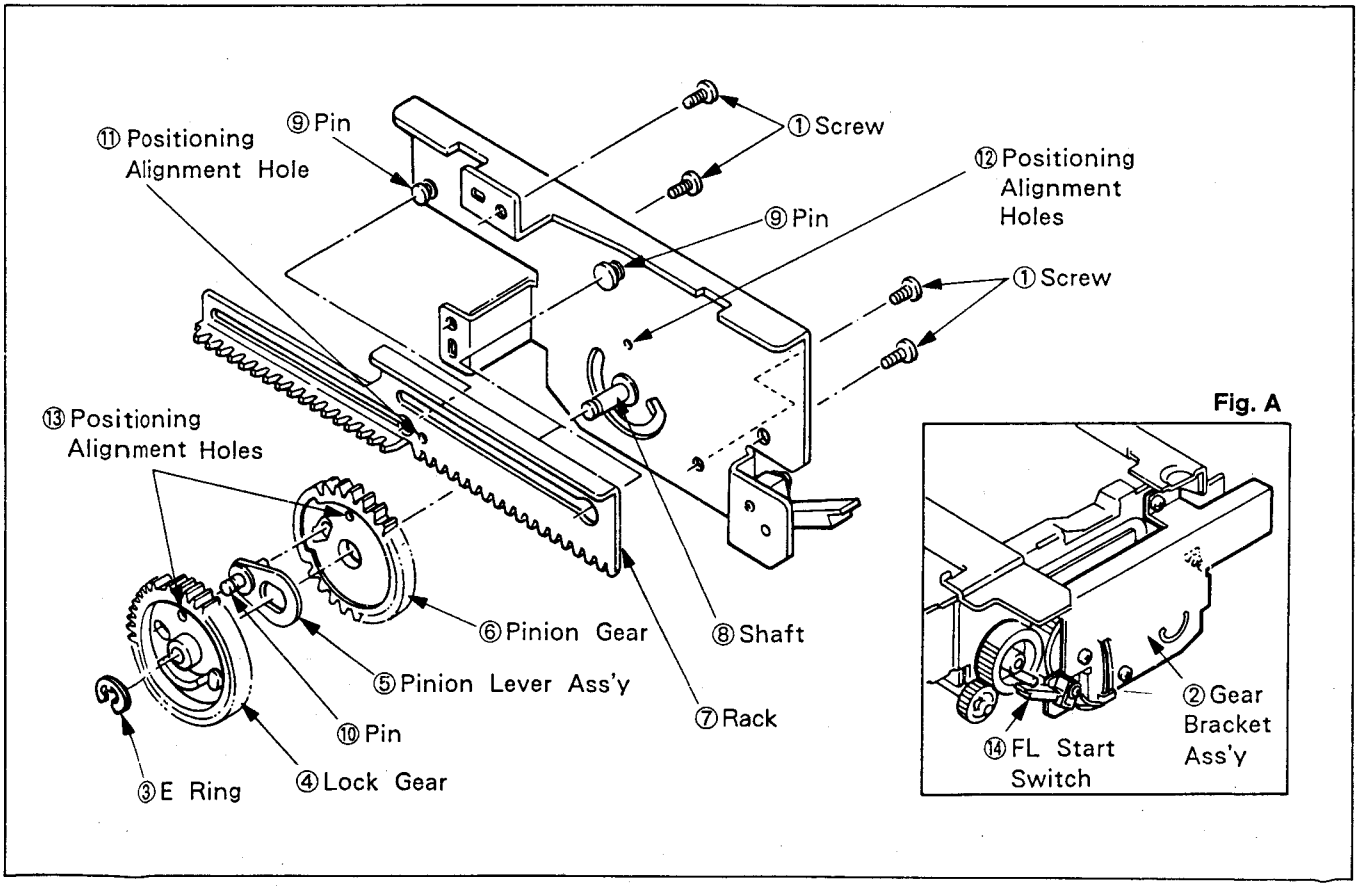


Fig. 5-2-2. Gear Bracket Ass'y

5-2-3. Cassette Drive Gear (Right) (See Fig. 5-2-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM and the GEAR BRACKET ASS'Y as instructed in 5-2-1. and 5-2-2., respectively.
2) Remove the IDLER GEAR ①.
3) Remove the SPRING COIL ②, then remove the MAIN GEAR ③.
4) Remove the E ring ④, then remove the LEVER GEAR ASS'Y R ⑤.
5) Open the hook ⑥ and remove the COUPLE GEAR R ⑦. Take care not to open the hook ⑥ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the IDLER GEAR R ⑧.

2. Remounting

1) Apply grease to gear parts that undergo friction.
2) Mount the IDLER GEAR R ⑧ onto the axle ⑨.
3) Mount the COUPLE GEAR R ⑦ onto the ROD ASS'Y axle ⑩. When doing so, match the couple gear position with the IDLER GEAR R ⑧ as shown in Fig. A.
4) Mount the LEVER GEAR ASS'Y R ⑤ onto the axles ⑪ and ⑫. Match position to the IDLER GEAR R ⑧ as shown in Fig. A.
5) Mount the E ring ④ onto the axle ⑫.
6) Mount the MAIN GEAR ③ onto the axle ⑪. When doing so, match position to the IDLER GEAR R ⑧ as shown in Fig. A.
7) Hook the SPRING COIL ② to the notch ⑬ in the MAIN GEAR R ③ and the LEVER GEAR ASS'Y R.
8) Mount the IDLER GEAR ① onto the axle ⑭. When doing so, match position to the MAIN GEAR as shown in Fig. A.
9) Mount the GEAR BRACKET ASS'Y and the COMPL CASSETTE MECHANISM ASS'Y as instructed in 5-2-2. and 5-2-1., respectively.

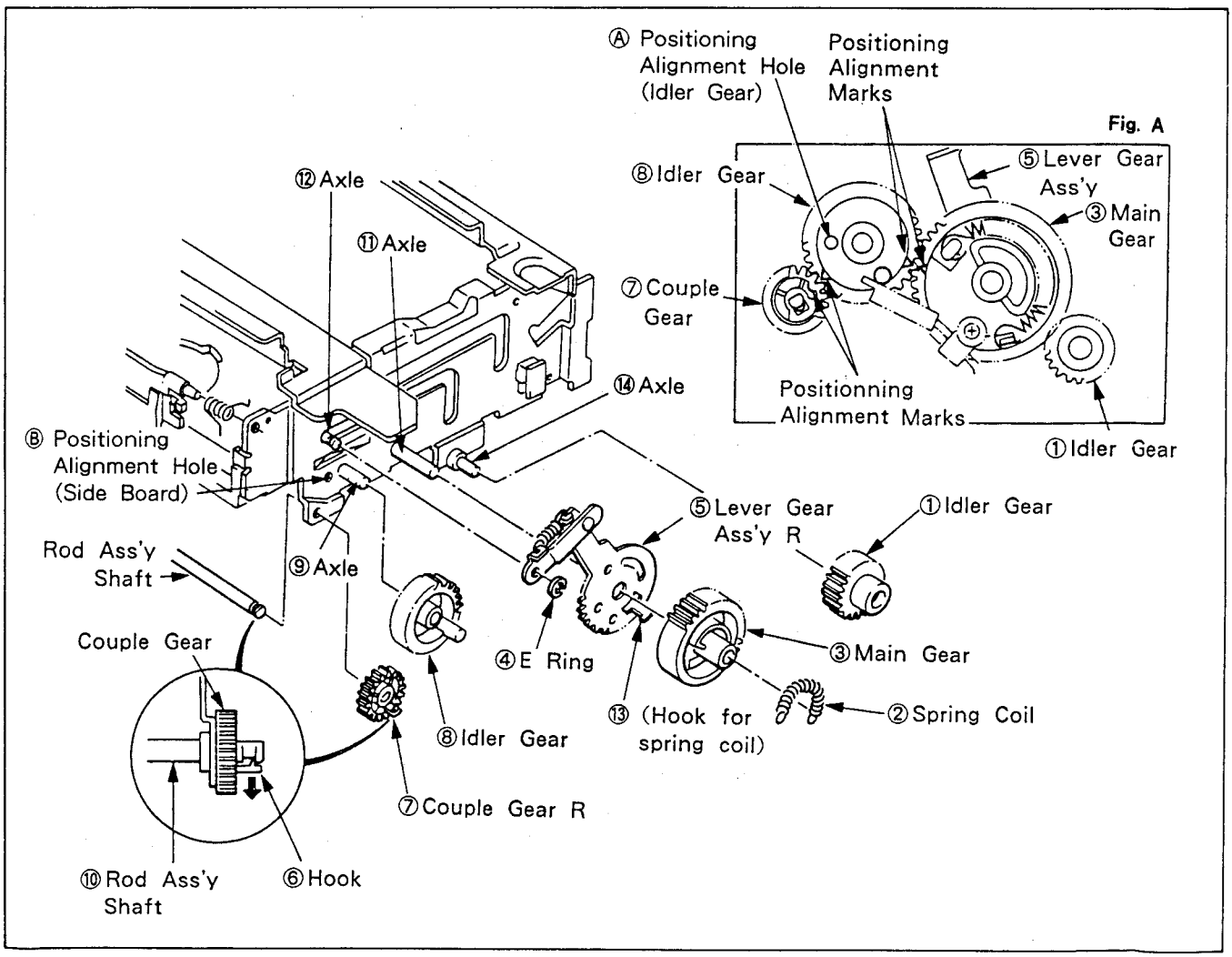


Fig. 5-2-3. Cassette Drive Gears (Right Side)

5-2-4. Cassette Drive Gear (Left) (See Fig. 5-2-4)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COUPLE GEAR R as instructed in 5-2-3.
3) Remove the ROD ASS'Y ①.
4) Remove the E ring ②.
5) Remove the hook ③, then remove the LEVER GEAR ASS'Y L ④. Take care not to open the hook ③ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the SPRING COIL ⑤ from the LEVER GEAR ASS'Y ④.
7) Remove the IDLER GEAR L ⑥ and the DOOR OPEN LEVER ⑦.

2. Remounting

1) Apply grease to the axles ⑧, ⑨ and ⑩.
2) Apply grease to the IDLER GEAR L ⑥.
3) Mount the DOOR OPEN LEVER ⑦ onto the axle ⑧. Do it so that the end of the DOOR OPEN LEVER ⑦ leans against the front side of the CASSETTE DOOR ⑪ as shown in Fig. A.
4) Mount the IDLER GEAR L ⑥ onto the axle ⑧.
5) Pass the ROD ASS'Y ① through the hole ⑫. Match position of the COUPLE GEAR L ⑬ and the IDLER GEAR L ⑥ as shown in Fig B.
6) Mount the COUPLE GEAR R as instructed in 5-2-3.
7) Hook the SPRING COIL ⑤ to the LEVER GEAR ASS'Y L ④.
8) Mount the LEVER GEAR ASS'Y L ④ onto the axle ⑨ and the shaft ⑩. Match position to the IDLER GEAR L ⑥ as shown in Fig. B.
9) Mount the COMPL CASSETTE MECHANISM onto the chassis as instructed in 5-2-1.

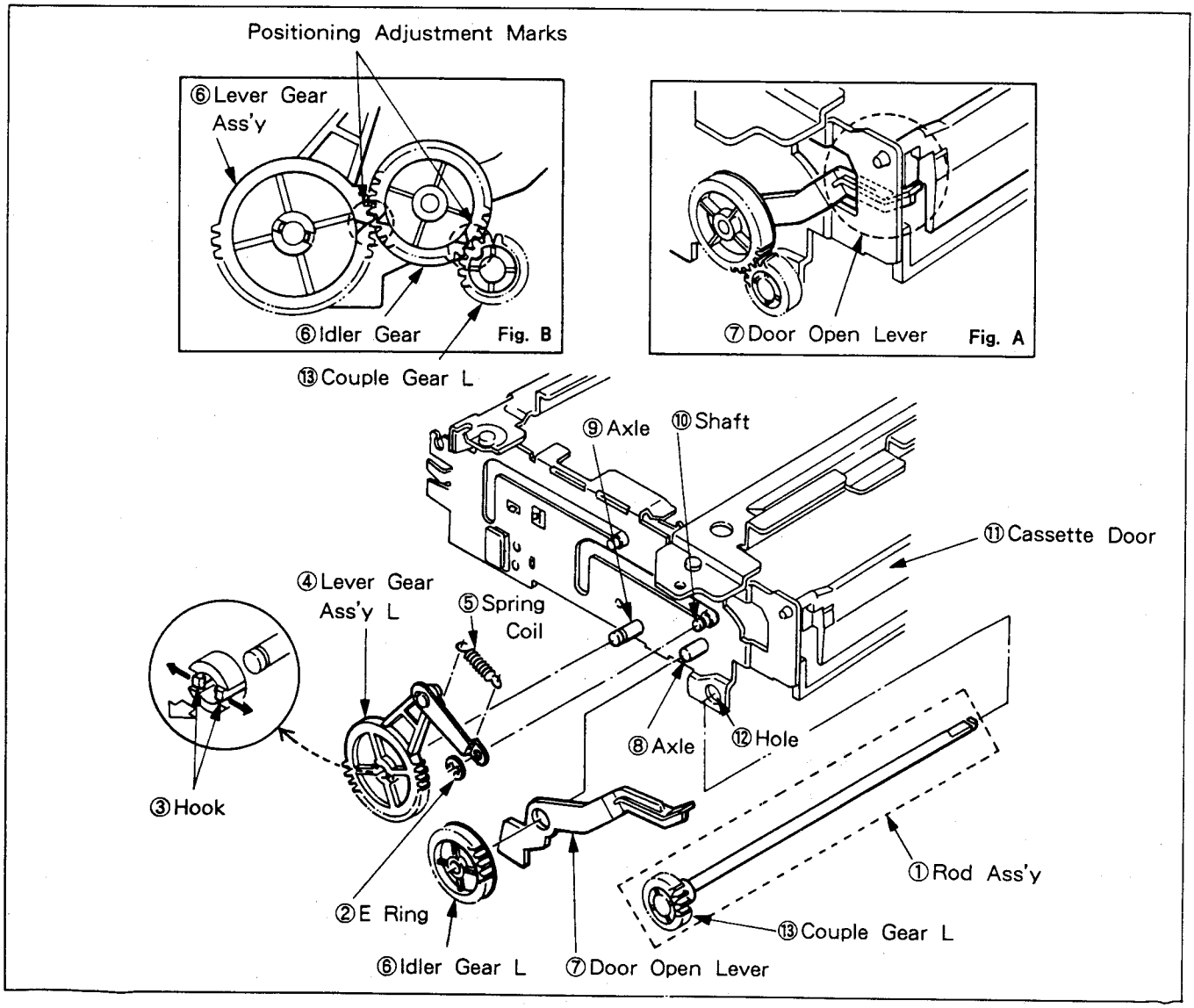


Fig. 5-2-4. Cassette Drive Gears (Left Side)

5-2-5. FL Start Switch (See Fig. 5-2-5.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the screw ①.
3) Remove the lead wire of the FL START SWITCH ②.

2. Remounting

1) Solder the lead wire to the FL START SWITCH ② terminal.
2) Align the FL START SWITCH ② protuberance to the hole ⑤, then mount it onto the GEAR BRACKET ASS'Y ③ with the screw ①. Do it so that the FL START SWITCH ② is turned ON by holding the pin ④ of IDLER GEAR in the EJECT completed mode.
3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

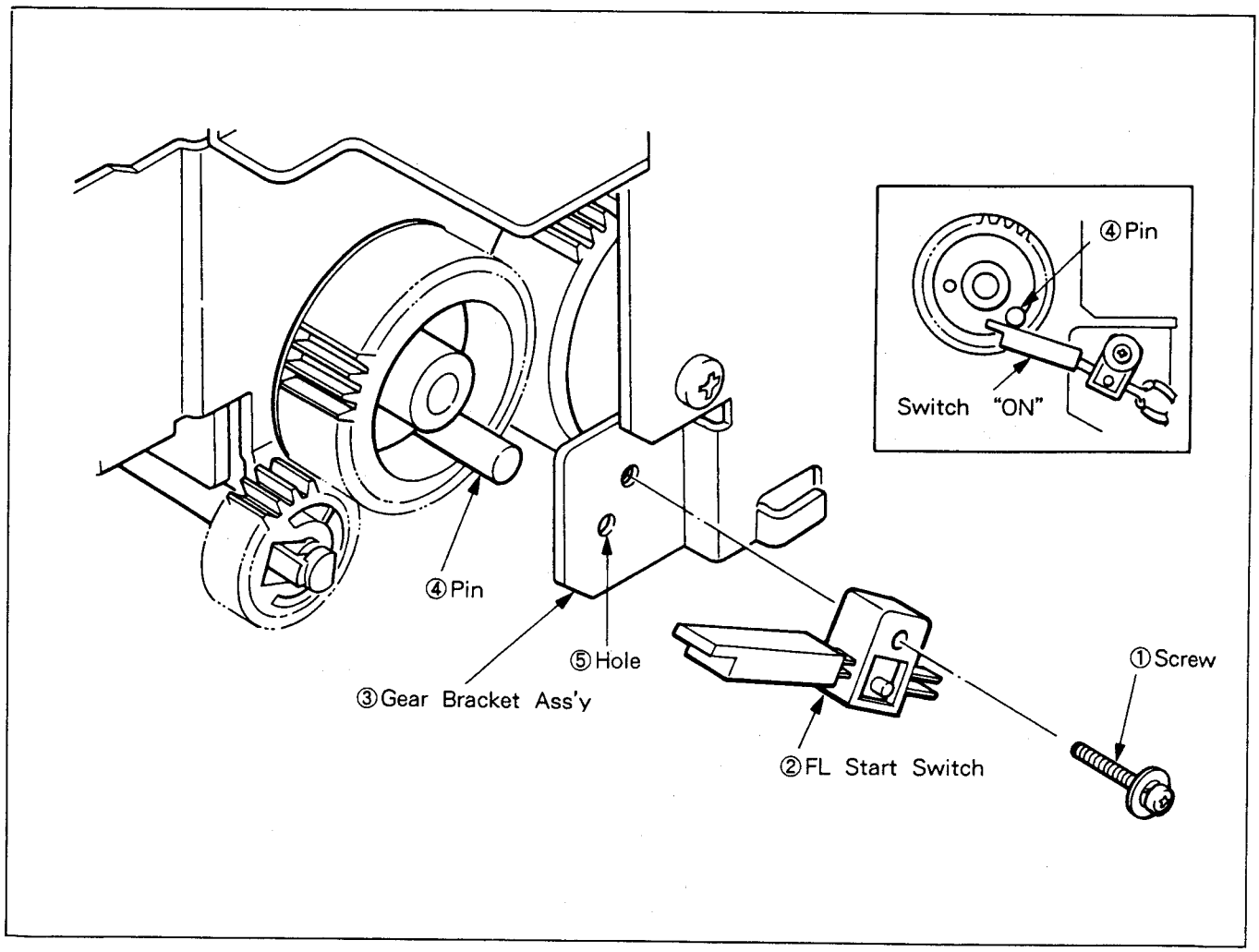


Fig. 5-2-5. FL Start Switch

5-2-6. T-Top Sensor, T-End Sensor (See Fig. 5-2-6.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) When removing the T-TOP SENSOR, remove the GEAR BRACKET ASS'Y as instructed in 5-2-2.
3) Unhook the hook ① as instructed in Fig. A, then remove the LID ②. Take care not to push the hook ① too much, otherwise it may be deformed or broken.
4) Remove the phototransistors ③, then remove the lead wire.

Note : Mounting position of the transistor holder on the T-END SENSOR side is precisely adjusted at the factory, so do never remove it from the COMPL CASSETTE MECHANISM.

2. Remounting

1) Solder the brown lead wire to the emitter side, and the red lead wire to the collector side of the T-TOP SENSOR phototransistor ③.
   Solder the orange lead wire to the emitter side, and the yellow lead wire to the collector side of the T-END SENSOR phototransistor.
2) Mount the phototransistors ③ onto their respective holders.
3) Mount the LID ② and fix it with the hook ①.
4) Mount the GEAR BRACKET ASS'Y as instructed in 5-2-2.
5) Mount the COMPL CASSETTE MECHANISM as insturcted in 5-2-1.

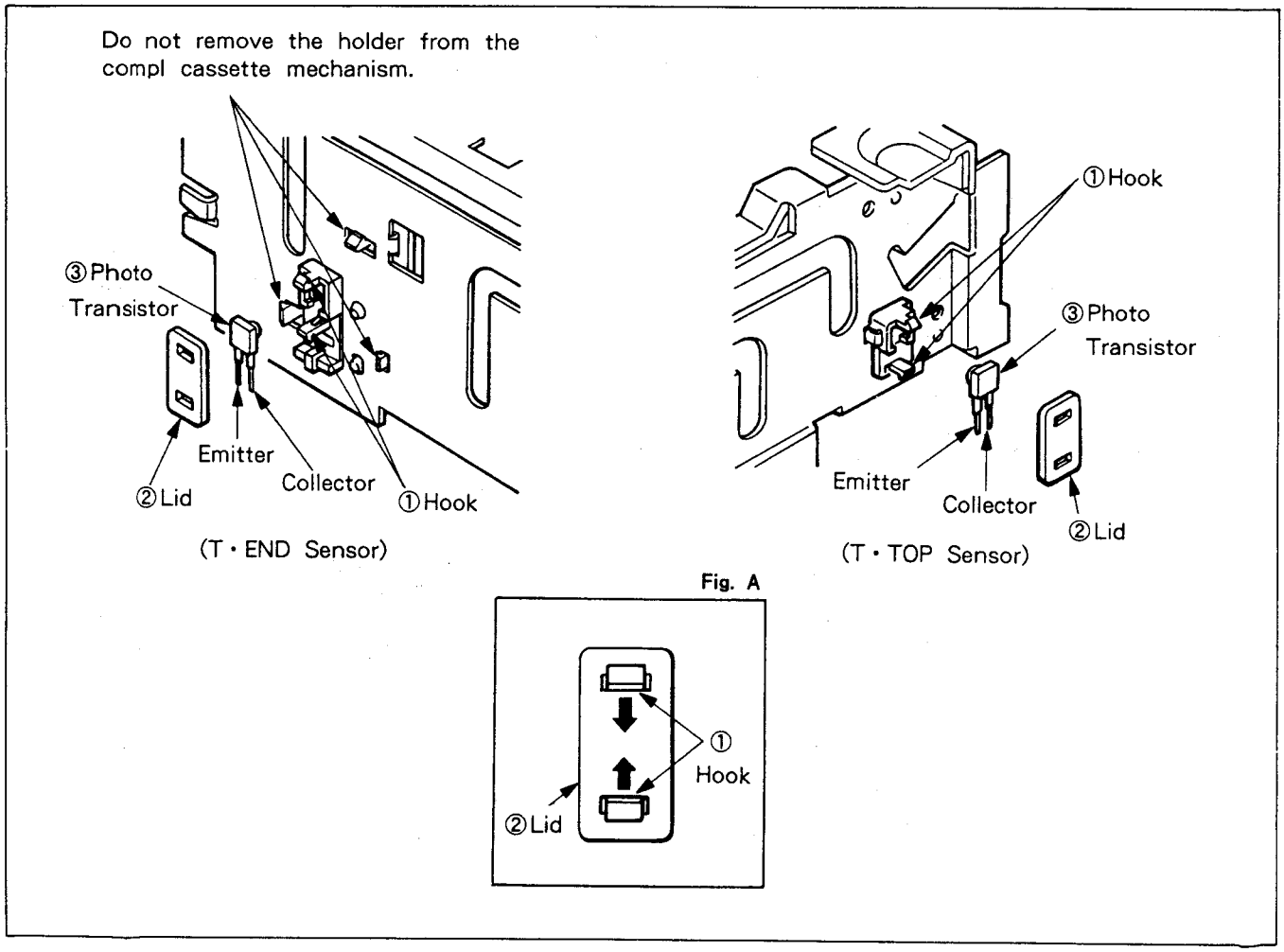


Fig. 5-2-6. T TOP Sensor & T END Sensor

5-3. COMPL HOLDER MOTOR (LOADING MOTOR BLOCK)

5-3-1. COMPL Motor Bracket

1. Removal

1) Remove the PRE-AMP UNIT and the PRE-AMP. BRACKET as instructed in 5-1.
2) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
3) Remove the two screws ① and the other one ⑩, then remove the COMPL HOLDER MOTOR ② (see Fig. 5-3-1.).

2. Remounting

1) Set the mechanism chassis to the INITIAL mode. In this mode, look at the mechanism chassis positioning holes ③ just from above and align the MAIN CAM ④ and MODE CAM ⑤ positioning holes as shown in Fig. A.
2) Set the COMPL HOLDER MOTOR ② to the INITIAIL mode with the mode selector (VHJ-0050). In this position, the FRONT LOADING GEAR △ mark ⑥ is aligned with the MOTOR HOLDER INITIAL mode position mark ⑦ (see Fig. B.).
3) Align the ROTARY SWITCH (mode detector switch) ⑧ with the INITIAL mode position mark ⑨ (see Fig. C.).
4) Align the COMPL HOLDER MOTOR main unit ② with the protuberance ⑪, then mount it with the two screws ① and the other one ⑩.
5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
6) Mount the PRE-AMP UNIT and the PRE-AMP. BRACKET as instructed in 5-1.

Note : Normal mechanism operation cannot be achieved if initial positioning of the MAIN CAM ④, the MODE CAM ⑤ and the ROTARY SWITCH (mode detector switch) ⑧ are not performed precisely.

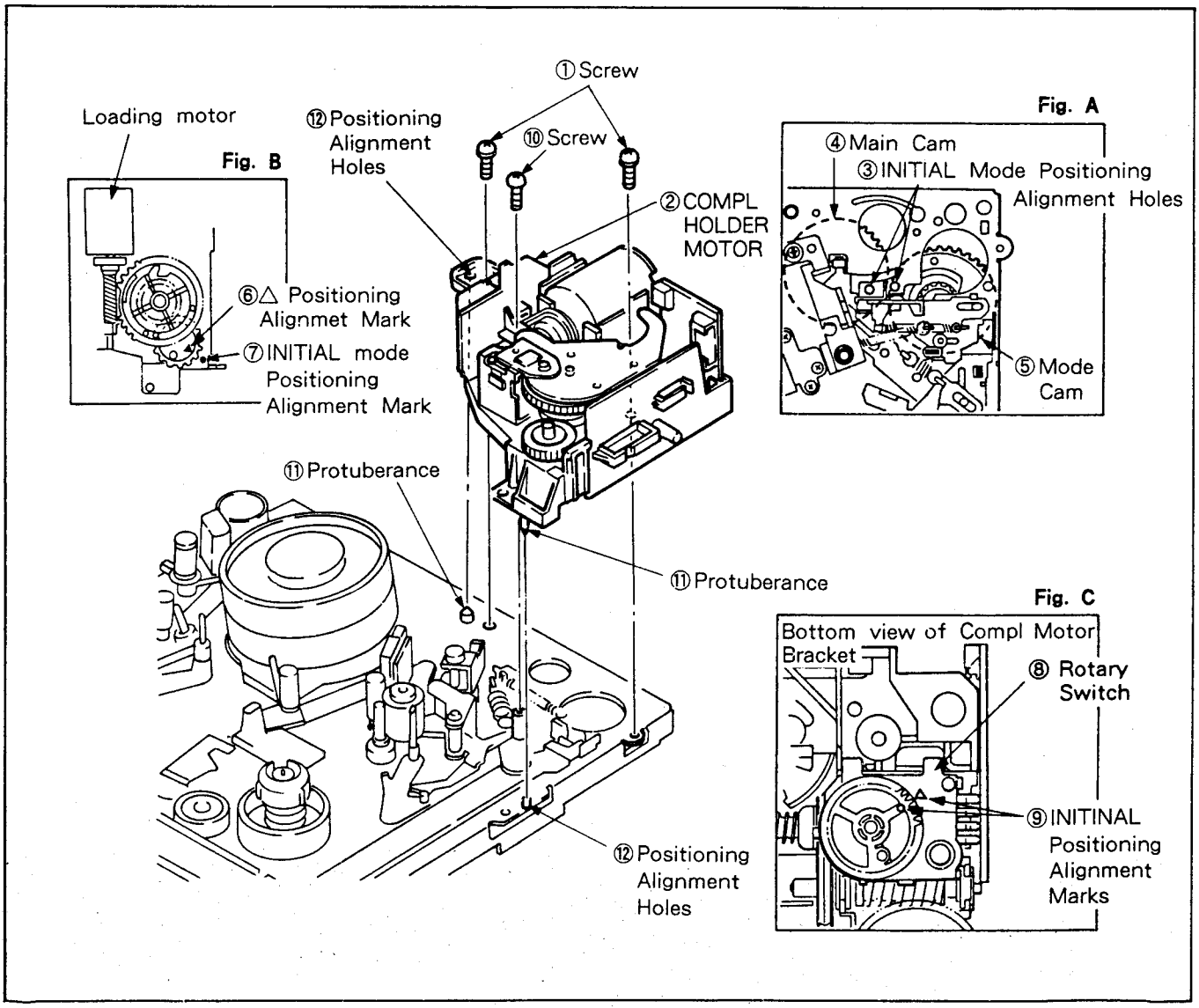


Fig. 5-3-1 Compl Holder Motor

5-3-2. Loading Motor (Refer to Fig. 5-3-2.)

1. Removal

LOADING MOTOR can be replaced after LOADING MOTOR BLOCK unit has been removed by referring to 5-3-1. The 1990 version of the mechanism allows LOADING MOTOR itself to be replaced without removing CASSETTE HOLDER BLOCK and LOADING MOTOR BLOCK. The following describes this procedure.

1) Use MODE SELECTOR (VHJ-0050) to set the mechanism to the initial mode.
2) Remove the connector for DEW SENSOR connected to the MC-3 board ①.
3) Remove three screws ② and remove HOLDER BRACKET ④ with FRONT WORM ASS'Y ③ still attached.
4) Remove DAMPER ⑥ attached to the pulley of LOADING MOTOR ⑤.
5) Remove FRONT HELICAL GEAR ⑦ and WASHER ⑧.
6) Remove soldered LEAD WIRE from the terminal of LOADING MOTOR ⑤.
7) Remove LOADING BELT ⑨.
8) Remove LOADING MOTOR ⑤ by lifting up from the back terminal side.

2. Remounting

Before attaching LOADING MOTOR ⑤ to MOTOR BRACKET ASS'Y ⑩, confirm DAMPER ⑪ and DAMPER ⑫ shown in Fig. 5-3-5. are in the proper position on MOTOR BRACKET ASS'Y ⑩.

1) LOADING MOTOR ⑤ puts REAR SIDE BOSS ㉓ in the slit ㉔ of MOTOR HOLDER ⑩.
   Further, mount the tap hole ⑬ at two points of the front pulley side so that the it is secured to the PROTUBERANCE ⑭ of the MOTOR HOLDER at two points.
2) Solder the lead wire from the MC-3 board to LOADING MOTOR ⑤ terminal. (Solder the red lead wire to the positive terminal side.)
3) Hang LOADING BELT ⑨ on the pulley.
4) After hanging BELT ⑨ on the pulley, confirm that the mechanism unit is in the initial mode. The initial mode is indicated by Fig. A of Fig. 5-3-2., and is the position in which INITIAL POSITIONING ALIGNMENT HOLEs of MAIN CAM ⑮ and MODE CAM ⑯ are lined up with THROUGH HOLE ⑰ of MOTOR HOLDER. If the initial mode is not selected, adjust with MODE SELECTOR (VHJ-0050).
5) As shown in Fig. B, confirm the positions of the △ POSITIONING ALIGNMENT MARK on FRONT LOAD GEAR ⑱ and INITIAL MARK ⑲ position of MOTOR HOLDER and the position relationship of CASSETTE HOLDER RACK ⑳.
6) Apply a light coat of grease to the entire sides of AXLE ㉑ and FRONT HELICAL GEAR ⑦.
7) Attach FRONT HELICAL GEAR ⑦ and WASHER ⑧ to AXLE ㉑. As shown in Fig. C, FRONT HELICAL GEAR ⑦ is attached so that the indent on the side is inside PIN ㉒ of FRONT LEVER ASS'Y.
8) Attach DAMPER ⑥ to LOADING MOTOR ⑤ pulley.
9) HOLDER BRACKET ④ is attached by engaging FRONT WORM ASS'Y ③ with LOADING MOTOR ⑤ pulley, and held in place with three screws ②.
10) Attach the connector of DEW SENSOR ㉕ to the MC-3 board ① and return the mechanism to the eject completion using MODE SELECTOR.

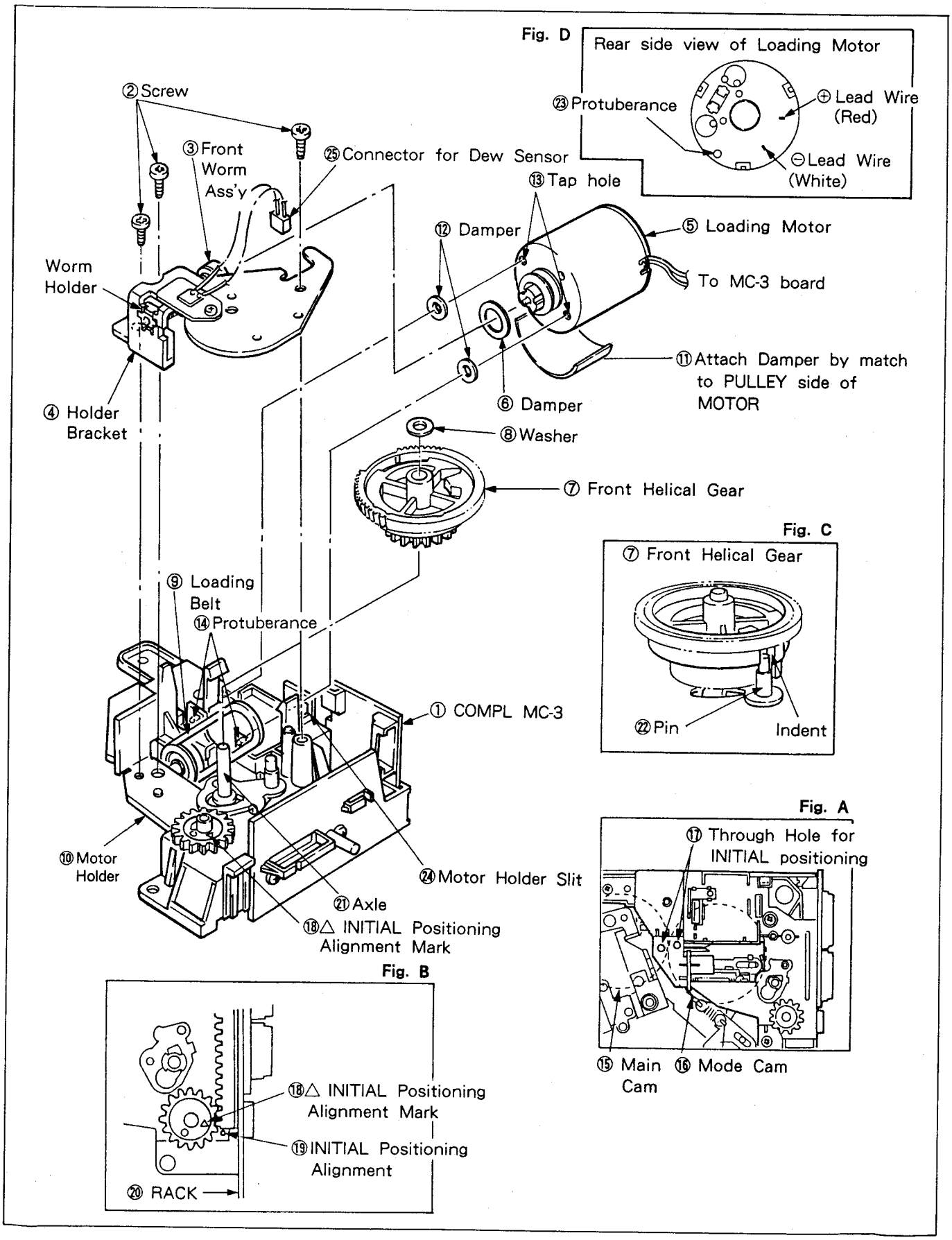


Fig. 5-3-2. Loading Motor

5-4. TAPE LOADING MECHANISM

5-4-1. Main Parts of the Tape Loading Mechanism (See Fig. 5-4-1.)

1. Removal

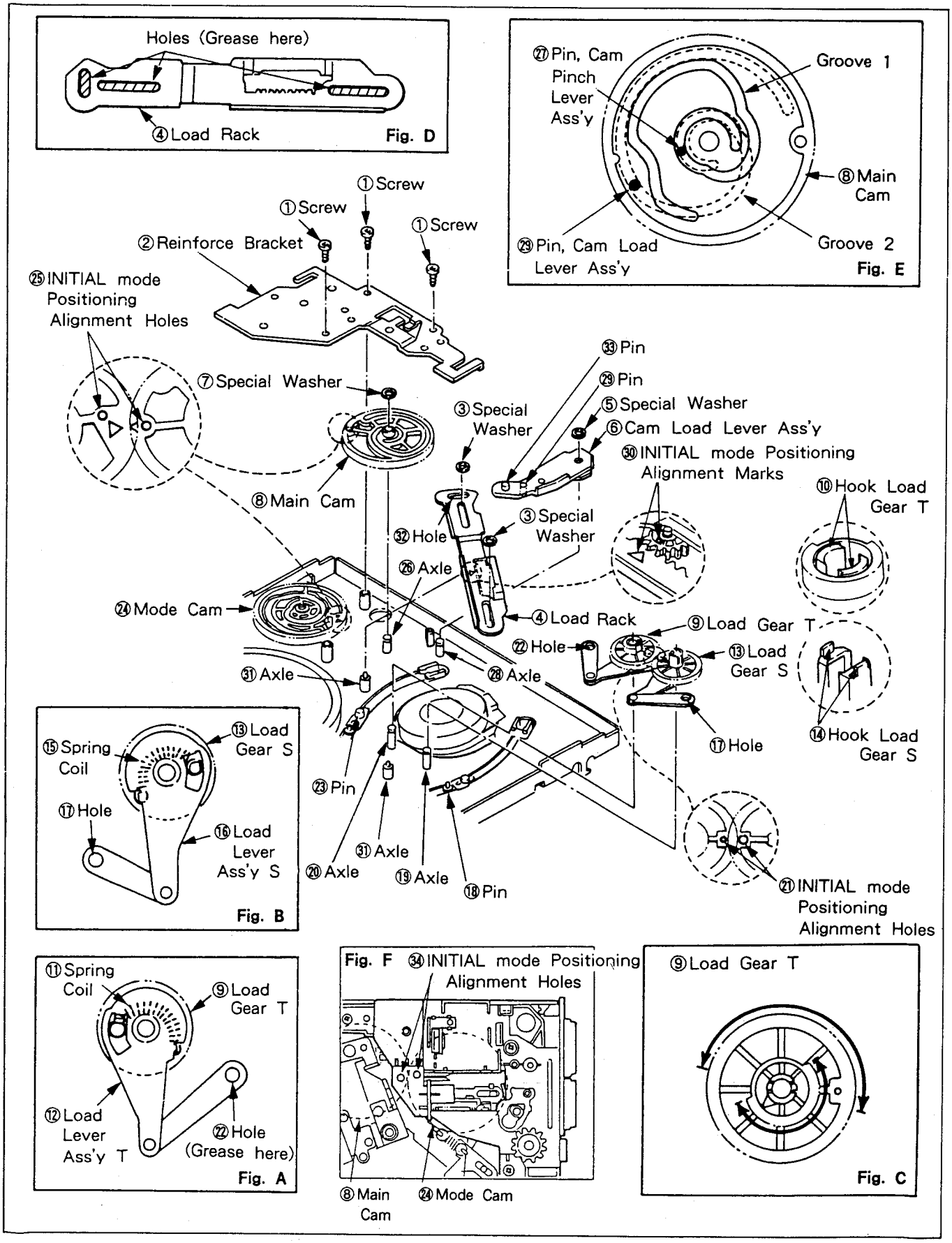
1) Remove connectors from the DRUM MOTOR board (SV-5).
2) Remove the three screws ①, then remove the REINFORCE BRACKET ②.
3) Remove the two special washers ③, then remove the LOAD RACK ④.
4) Remove the special washer ⑤, then remove the CAM LOAD LEVER ASS'Y ⑥.
5) Remove the stop washer ⑦, then remove the MAIN CAM ⑧.
6) Unhook the LOAD GEAR T hook ⑩, then remove the LOAD GEAR T ⑨ as shown in Fig. A, with the SPRING COIL ⑪ and the LOAD LEVER ASS'Y T ⑫ attached to it.
7) Unhook the LOAD GEAR S hook ⑭, then remove the LOAD GEAR S ⑬ as shown in Fig. B, with the SPRING COIL S ⑮ and the LOAD LEVER ASS'Y S ⑯ attached to it.

Note : Take care not to open the LOAD GEAR hooks too much, otherwise they may be deformed or broken. If they are, replace them.

2. Remounting

1) Apply grease to the inner surface of the LOAD LEVER ASS'Y S ⑯ hole ⑰, as shown in Fig. B.
2) Apply grease to the inner surface of the LOAD LEVER ASS'Y T ⑫ hole ㉒ and to the section of the LOAD GEAR T ⑨ indicated with an arrow in Fig. C.
3) Apply grease to GROOVEs 1 and 2 of the MAIN CAM ⑧, and to the outer side of the teeth.
4) Apply grease to the three oval holes of the LOAD RACK ④ as shown in Fig. D.
5) Apply grease to the outer surface of axles ⑲ ⑳㉖ and ㉘.
6) After assembling as shown in Fig. B, mount the LOAD GEAR S ⑬ onto the axle ⑲. Insert the ROLLER BASE S pin ⑱ into the LOAD LEVER ASS'Y S hole ⑰.
7) After assembling as shown in Fig. A, mount the LOAD GEAR T ⑨ onto the axle ⑳. When doing so, set the LOAD GEAR S ⑬ and the LOAD GEAR T ⑨ to the INITIAL mode position ㉑. Insert the ROLLER BASE T pin ㉓ into the hole ㉒ of the LOAD LEVER ASS'Y T ⑫.
8) Mount the MAIN CAM ⑧ on the axle ㉖. At that time, make sure that the positioning hole ㉕ of the MAIN CAM ⑧ and the MODE CAM ㉔ matches the initial positioning hole ㉞ of the MECHANISM CHASSIS. Also check to be sure that the Pin ㉗ of the CAM PINCH LEVER ASSEMBLY is put in the groove ① of the MAIN CAM as shown in Fig. E.
9) Mount the special washer ⑦ to the axle ㉖.
10) Mount the CAM LOAD LEVER ASS'Y ⑥ onto the axle ㉘. Insert the pin ㉙ into the MAIN CAM GROOVE 2 as shown in Fig. E.
11) Mount the special washer ⑤ onto the axle ㉘.
12) Set the LOAD RACK ④ to the INITIAL mode position ㉚ with the LOAD GEAR T ⑨, and mount onto the two axles ㉛. Insert the CAM LOAD LEVER ASS'Y pin ㉝ into the hole ㉜.
13) Mount the two special washers ③ onto the two axles ㉛.
14) Mount the REINFORCE BRACKET ② with the three screws ①.
15) Insert the connector into the DRUM MOTOR board (SV-5).
16) Confirm that loading and unloading are performed smoothly.

Note : Be sure to perform INITIAL mode positioning of cams and gears precisely.



5-4-1. Loading Mechanism Main Parts

5-4-2. Mode Cam (See Fig. 5-4-2.)

1. Removal

1) Set the INITIAL mode with the mode selector (VHJ-0050).
2) Remove the REINFORCE BRACKET as instructed in 5-4-1.
3) Remove the two stop washers ①, then remove the CAM PLATE SLIDE ASS'Y ②.
4) Remove the MODE CAM ③.

2. Remounting

1) Referring to 5-4-1., confirm that the MAIN CAM is in the INITIAL mode position.
2) In case the MAIN CAM is misplaced, use the mode selector (VHJ-0050) to align the MAIN CAM positioning hole with the chassis INITIAL mode position hole (refer to 5-4-1. for the INITIAL mode position). Since the ROTARY SWITCH (mode detector switch) does not rotate, the mode selector indicator lamp will not show the correct mode.
3) Align the ROTARY SWITCH (mode detector switch) ④ with the INITIAL mode position mark ⑤ as shown in Fig. A.
4) Mount the MODE CAM ③ onto the axle ⑥. Do it so that the SLIDE CAM ASS'Y pin ⑪ is placed in the GROOVE 3 as shown in Fig. B.
5) Mount the CAM PLATE SLIDE ASS'Y ② onto the axles ⑥ and ⑦. Do it so that the pin ⑧ gets into the GROOVE 4 of the MODE CAM as shown in Fig. B, and the point ⑨ of the bent-up part into the ACT PLATE SLIDE ASS'Y hole ⑩.
6) Mount the two special washers ① onto the axles ⑥ and ⑦.
7) Mount the REINFORCE BRACKET as instructed in 5-4-1.

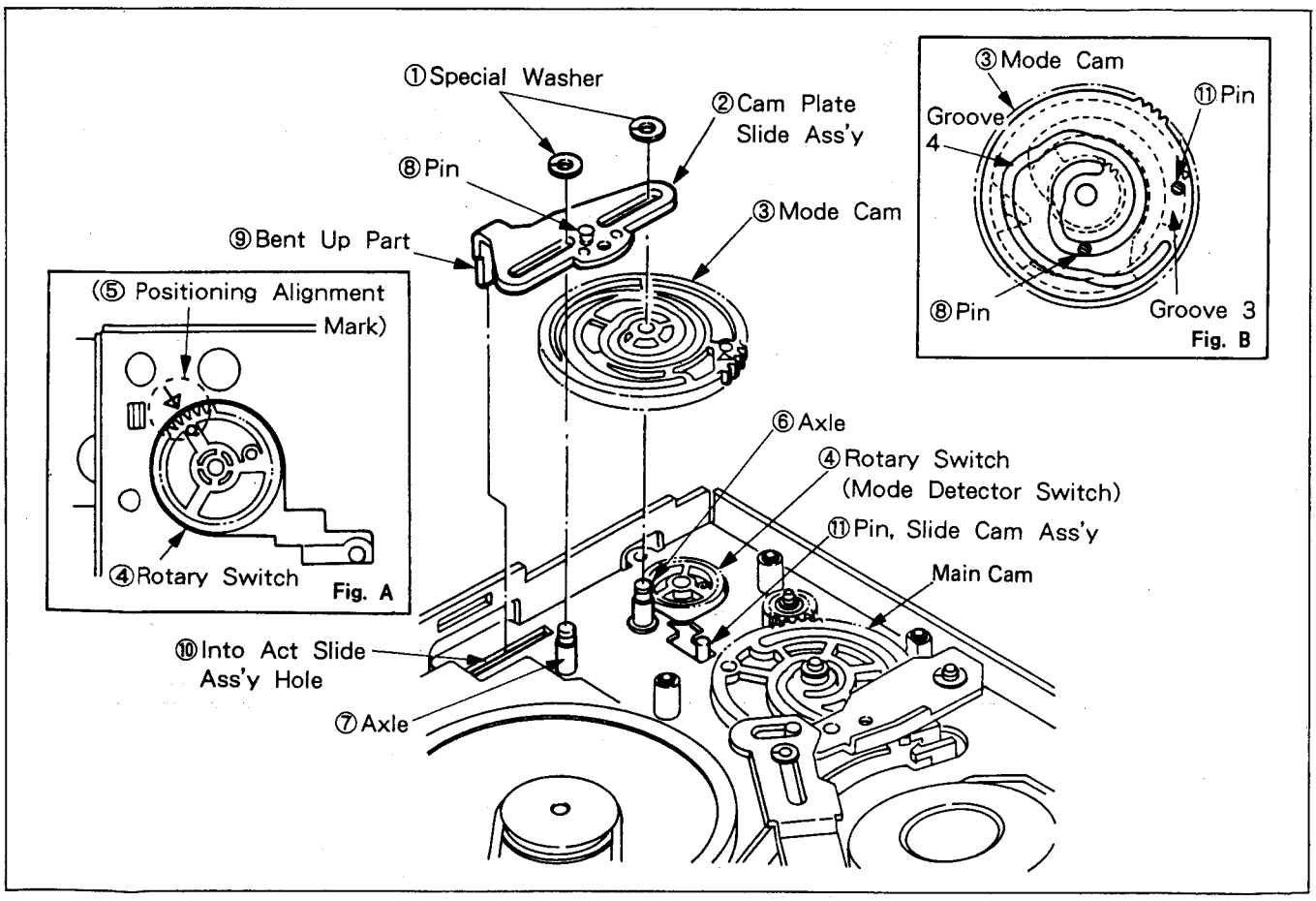


Fig. 5-4-2. Mode Cam

5-5. COMPL HEAD BRACKET (ACE HEAD) (See Fig. 5-5-1.)

1. Removal

1) Remove the COMPL HEAD BRACKET special mounting nut ②.
2) Remove the SLEEVE ③, the COMPL HEAD BRACKET ① and the ACE HEAD SPRING COIL ④, in that order.

Note : Take care not to scratch or soil the ACE head surface.

2. Remounting

1) Apply grease to the axle ⑥ as shown in Fig. A.
2) Apply grease to the spot where the COMPL HEAD BRACKET ① makes contact with the STOPPER ⑦ (See Fig. A).
3) Mount the ACE HEAD SPRING COIL ④ and the COMPL HEAD BRACKET ①, in that order, onto the axle ⑥. Hook one end of the ACE HEAD SPRING COIL ④ to the notch ⑤, and the other end to the COMPL HEAD BRACKET, so that the COMPL HEAD BRACKET is pressed against the STOPPER ⑦ (See Fig. A).
4) Mount the SPECIAL NUT ② onto the axle ⑥ through the SLEEVE ③.
5) Clean the ACE head surface with a chamois leather moistened with methyl alcohol.
6) Perform ACE head adjustment as instructed in 6-4.

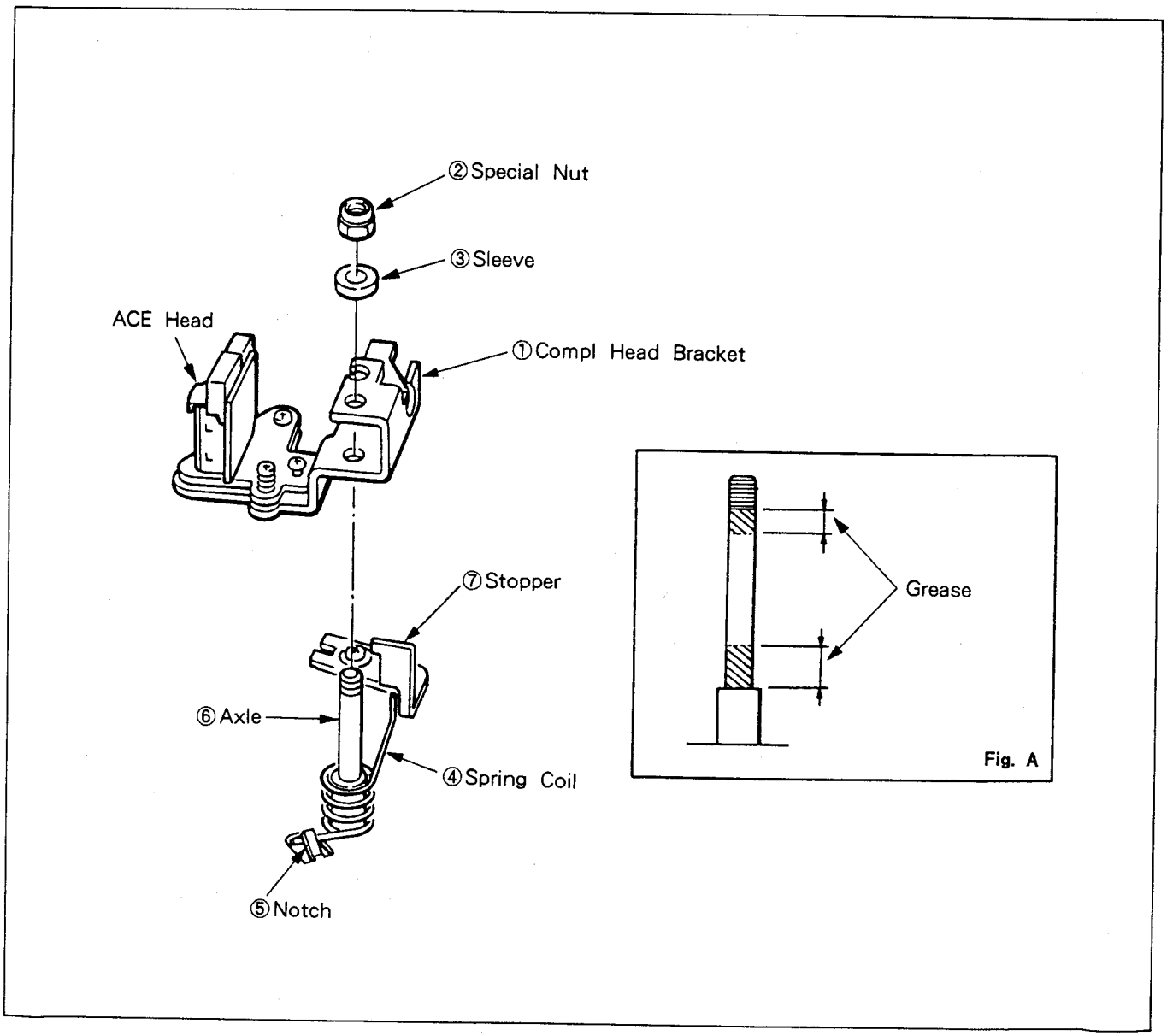


Fig. 5-5-1. Compl Head Bracket (ACE Head)

5-6. PINCH ROLLER PRESSURE MECHANISM (See Fig. 5-6-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COMPL HEAD BRACKET as instructed in 5-5.
3) Remove the PINCH SPRING COIL ①.
4) Remove the special washer ②, then remove the PINCH LEVER ASS'Y ③.
5) Remove the REV GUIDE LEVER SPRING COIL ④.
6) Remove the REV GUIDE LEVER ASS'Y ⑥ from the hook ⑤ of the plastic molding bearing on the bottom side. Use a jig VHJ-0073 shown in Fig. 5-6-2 to widen the hook ⑤ of the plastic molding bearing. By so doing, the above removal of the REV GUIDE LEVER ASS'Y ⑥ can be made more easily. Care should be taken to avoid pushing the jig VHJ-0073 too much. Pushing it too hard may damage the hook in an extreme case.
7) Remove the LINK LOCK SPRING COIL ⑦.
8) Remove the special washer ⑧, then remove the PINCH CAM LEVER ASS'Y ⑨.
9) Remove the ACT PINCH SLIDE ASS'Y ⑩.

Note : If damaged the claw ⑤ of the plastic bearing, reference should be made to Section 3. "Method of Repairing the Bearing Section of REV GUIDE LEVER ASSEMBLY".

2. Remounting

1) Apply grease to pins ⑫/⑬ and axles ⑯/⑱.
2) Apply grease to the ACT PINCH SLIDE ASS'Y pin ⑰.
3) Set the INITIAL mode with the mode selector (VHJ-0050).
4) Mount the ACT PINCH SLIDE ASS'Y ⑩ onto pins ⑫ and ⑬.
5) Insert the pin ⑭ of the PINCH CAM LEVER ASS'Y ⑨ into the MAIN CAM ⑪ GROOVE 1, and mount onto the axle ⑯ while inserting the pin ⑰ of the ACT PINCH SLIDE ASS'Y into the hole ⑮.
6) Mount the special washer ⑧ onto the axle ⑯.
7) Hook the LINK LOCK SPRING COIL ⑦ to the PINCH CAM LEVER ASS'Y ⑨.
8) Mount the REV GUIDE LEVER ASS'Y ⑥ to the plastic molding bearing, then fix it with the hook ⑤ at the bottom.
9) Hook the REV GUIDE LEVER SPRING COIL ④.
10) Mount the PINCH LEVER ASS'Y ③ to the axle ⑱.
11) Mount the special washer ② to the axle ⑱.
12) Hook the PINCH SPRING COIL ① between the ACT PINCH SLIDE ASS'Y ⑩ and the PINCH LEVER ASS'Y ③.
13) Mount the COMPL HEAD BRACKET as instructed in 5-5.
14) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
15) Perform ACE head adjustment as instructed in 6-4.

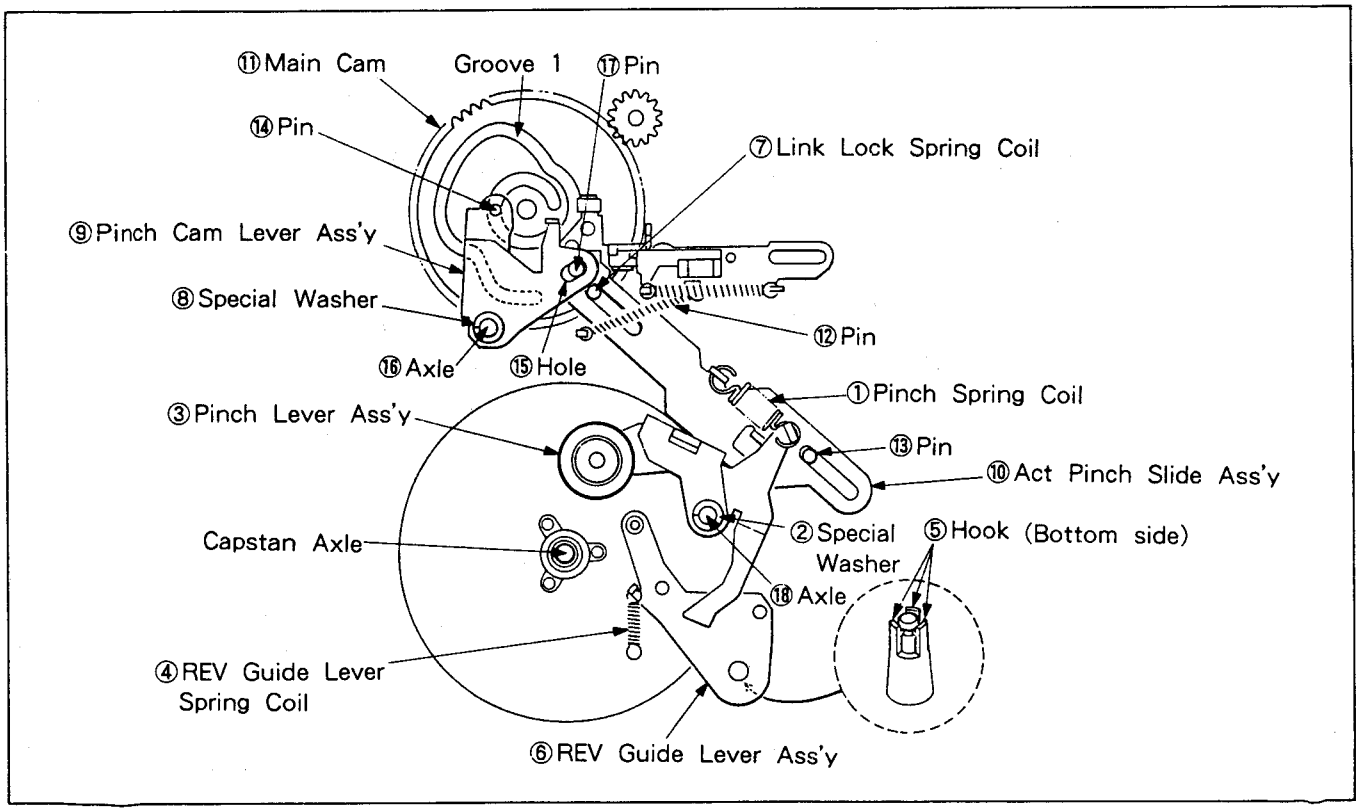
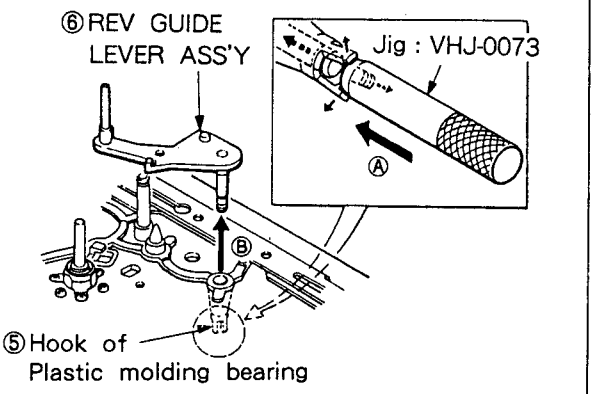


Fig. 5-6-1. Pinch Roller Pressing Mechanism



Remove REV GUIDE LEVER ASS'Y in the direction of arrow Ⓑ, pushing VHJ-0073 slightly in the direction of arrow Ⓐ.
Be careful not to damage the hook by pushing too much.

Fig. 5-6-2 Method of Using the Jig VHJ-0073

3. Method of Repairing the Bearing Section of REV GUIDE LEVER ASSEMBLY

If the hook of the plastic molding bearing is damaged in the process of removing the REV GUIDE LEVER ASS'Y, proceed with the repair as follows :

1) Scrape the broken hook of the bearing section with a cutter knife and flatten it.
2) Insert the REV GUIDE LEVER ASS'Y in the bearing and fit a stopper washer in. The special washer to be used must be Part No. 411 109 1605. This stop washer (Part No. 411 109 1605) is the same as that used on SUPPLY REEL ASS'Y or TAKE-UP REEL ASS'Y.
   Remove the REV GUIDE LEVER ASSEMBLY toward an arrow B while pushing the jig VHJ-0073 lightly in the direction of an arrow.

Pushing the jig VHJ-0073 too much may cause hook breakage. Therefore, care should be taken.

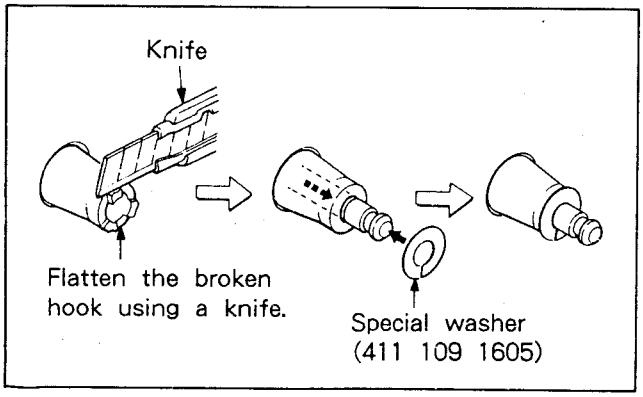


Fig. 5-6-3 Method of Repairing the Bearinig Section of the REV GUIDE LEVER ASSEMBLYE

5-7. BRAKE MECHANISM

5-7-1. Sub Take-up Brake Ass'y (See Fig. 5-7-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SPRING COIL ①.
3) While pushing the hook ② in the direction of arrow, remove the SUB TAKE-UP BRAKE ASS'Y ③.

2. Remounting

1) Mount the SUB TAKE-UP BRAKE ASS'Y ③ onto the pin ④. Confirm that the hook ② is firmly hooked to the chassis.
2) Fit the SPRING COIL between hooks ⑤ and ⑥.
3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

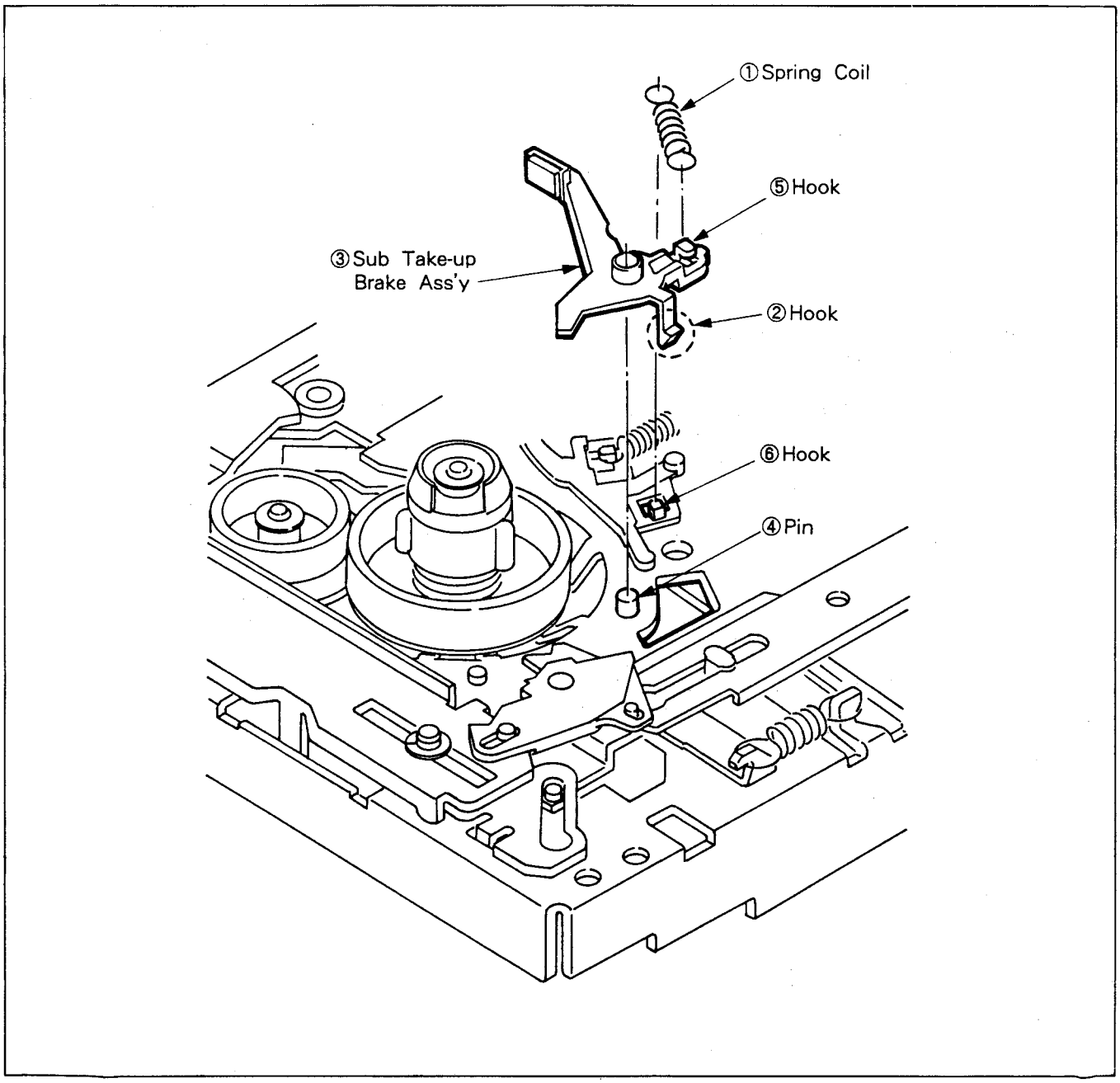


Fig. 5-7-1. Sub Take-up Brake Ass'y

5-7-2. Supply Brake Ass'y and Take-up Brake Ass'y (See Fig. 5-7-2.)

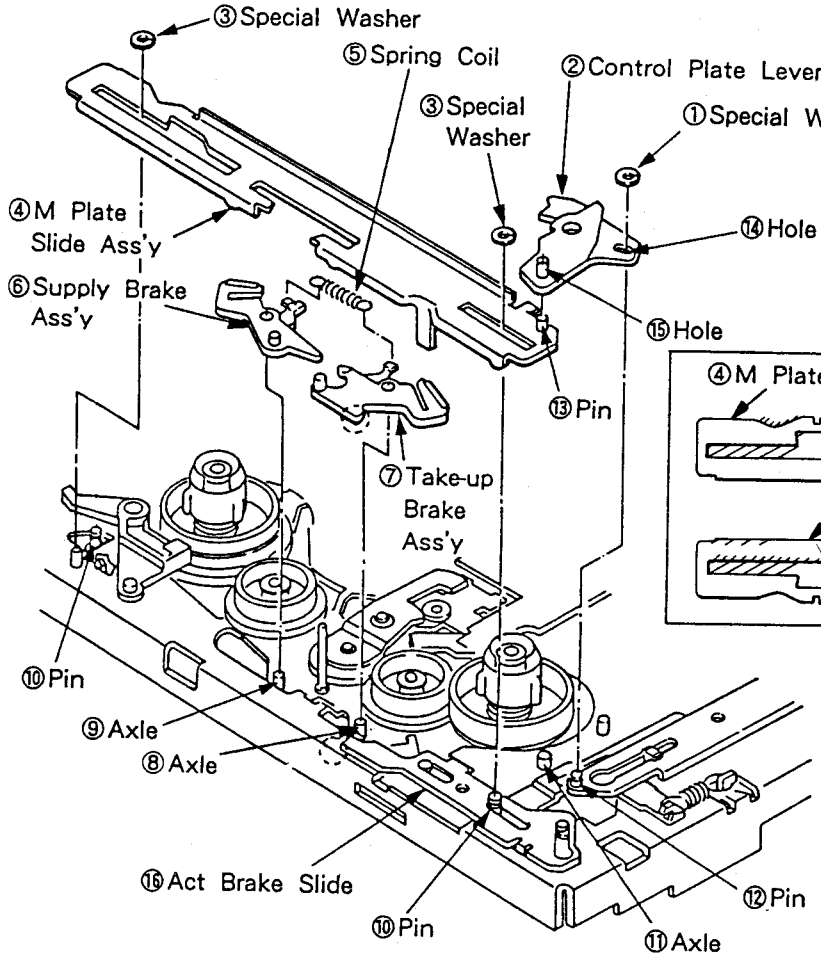
1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SUB TAKE-UP BRAKE as instructed in 5-7-1.
3) Remove the special washer ①, then remove the CONTROL PLATE LEVER ②.
4) Remove the two special washers ③, then remove the M PLATE SLIDE ASS'Y ④.
5) Remove the SPRING COIL ⑤.
6) Remove the SUPPLY BRAKE ASS'Y ⑥ and the TAKE-UP BRAKE ASS'Y ⑦.

Note : Take care not to soil the brake shoes.

2. Remounting

1) Apply a thin layer of grease to axles ⑧ and ⑨.
2) Mount the TAKE-UP BRAKE ASS'Y ⑦ onto the axle ⑧.
3) Mount the SUPPLY BRAKE ASS'Y ⑥ onto the axle ⑨.
4) After applying a thin layer of grease to the M PLATE SLIDE ASS'Y ④ as shown in Fig. A, mount it onto the two pins ⑩.
5) Mount the two special washers ③ onto the two pins ⑩.
6) After applying grease to the CONTROL PLATE LEVER ② as shown in Fig. B, mount it onto the axle ⑪. Insert the ACT PLATE SLIDE ASS'Y pin ⑫ into the hole ⑭, and the M PLATE SLIDE ASS'Y pin ⑬ into the hole ⑮.
7) Mount the special washer ① onto the pin ⑫.
8) Mount the SUB TAKE-UP BRAKE as instructed in 5-7-1.
9) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.



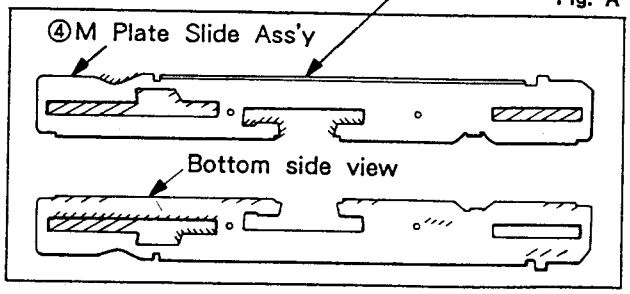


Fig. A

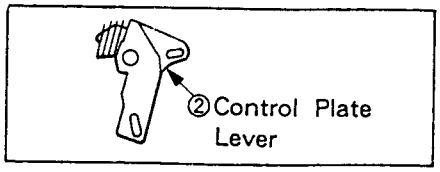


Fig. B

: Apply grease portion

When assembling, the contact surfaces of Take-up Brake ⑦ and the Brake Slide ⑯ marked with ◌ should contact but not overlap each other.

Fig. 5-7-2. Supply Brake Ass'y & Take-up Brake Ass'y

5-7-3. Tension Lever Ass'y and Band Holder Ass'y (See Fig. 5-7-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SPRING COIL ①.
3) Remove the screw ③ fixing the BAND HOLDER ASS'Y ②.
4) Push the SUB SUPPLY BRAKE ④ in the direction of the arrow A, setting the BAND HOLDER ASS'Y ② free.
5) Open the hook ⑤ a little and remove the TENSION LEVER ASS'Y ⑥. Take care not to open the hook ⑤ too much, otherwise it may be deformed or broken.
6) Remove the hook ⑦ of the BAND HOLDER ASS'Y.

2. Remounting

1) Mount the BAND HOLDER ASS'Y hook ⑦ into the TENSION LEVER ASS'Y hole ⑧.
2) Insert the TENSION LEVER ASS'Y axle ⑨ into the hole ⑩ and confirm that the hook ⑤ is hooked.
3) While pushing the SUB SUPPLY BRAKE ④ in the direction of arrow A, mount the BAND HOLDER ASS'Y ② with the screw ③.
4) Hook the SPRING COIL ① between the hooks ⑪ and ⑫.
5) Perform TENSION POLE position adjustment as instructed in 6-3.
6) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

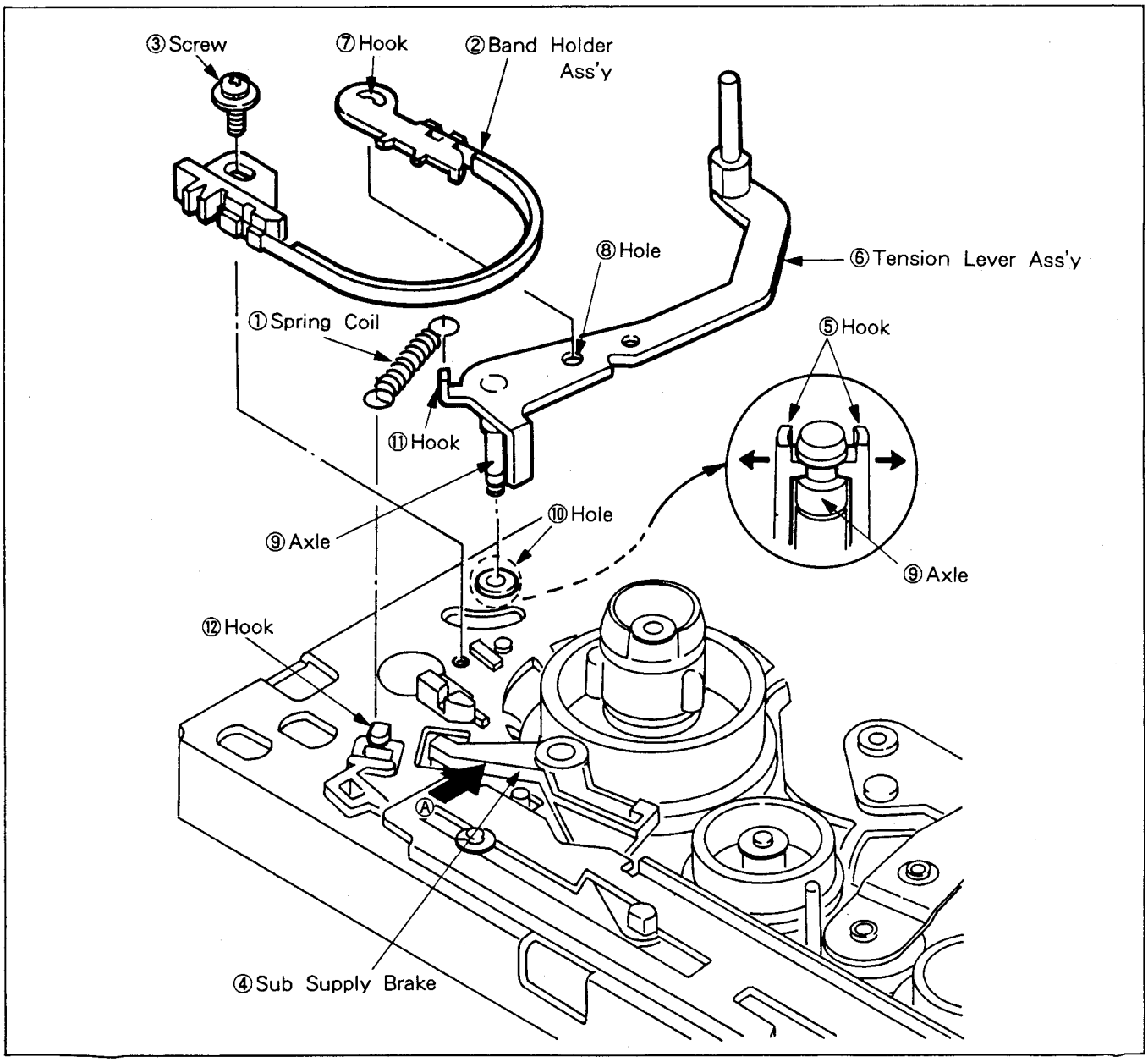


Fig. 5-7-3. Tension Lever Ass'y & Band Holder Ass'y

5-7-4. Capstan Brake Ass'y (See Fig. 5-7-4.)

1. Removal

1) Remove the SPRING COIL ①.
2) Unhook the hook ②, then remove the CAPSTAN BRAKE ASS'Y ③.

2. Remounting

1) Mount the CAPSTAN BRAKE ASS'Y ③ onto the axle ④. Confirm that the hook ② is hooked to the chassis.
2) Hook the SPRING COIL ① between hooks ⑤ and ⑥. Fix the hook ⑥ side with adhesive (use an adhesive that allows later detaching).

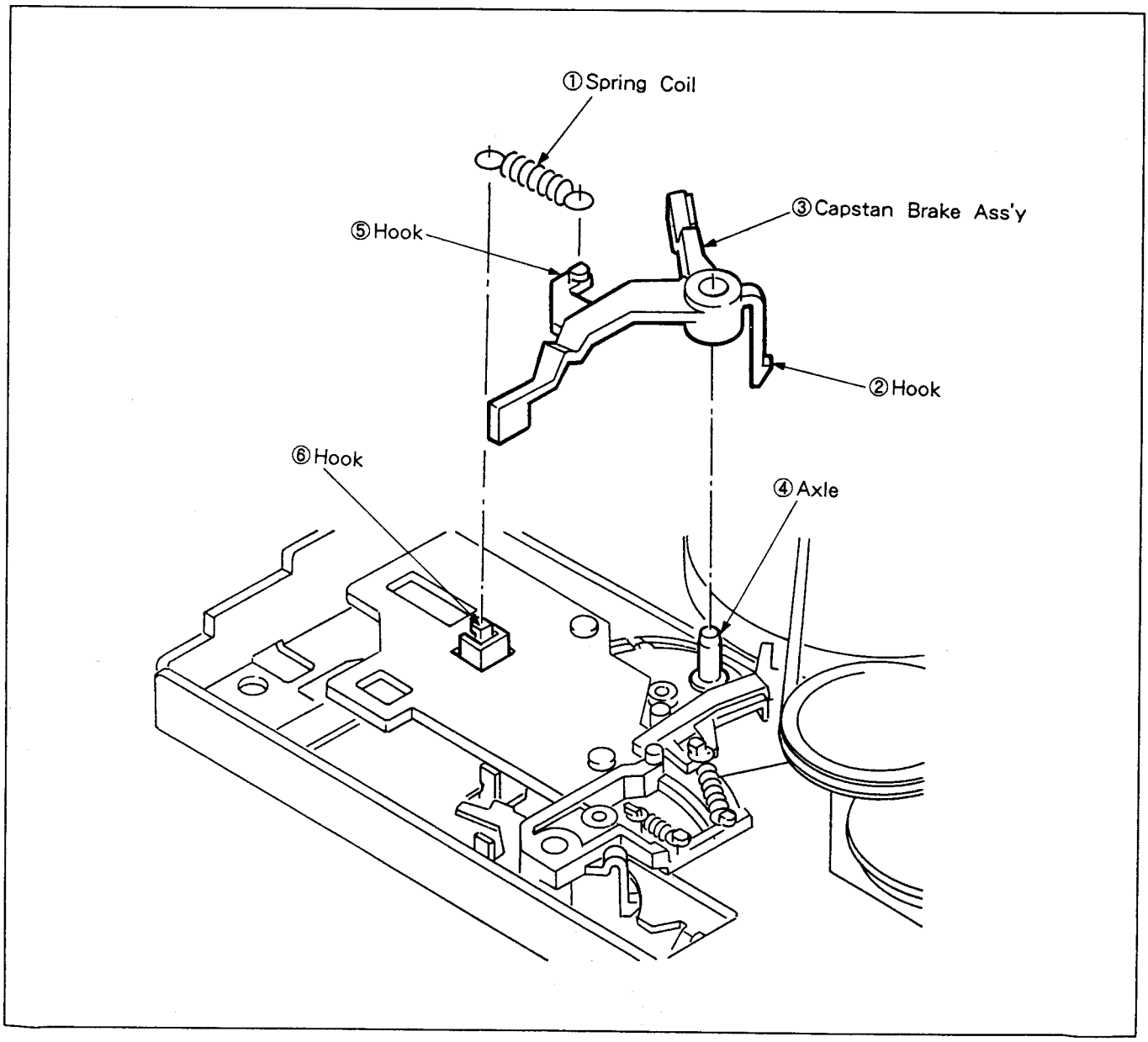


Fig. 5-7-4. Capstan Brake Ass'y

5-8. REEL TABLE DRIVE MECHANISM

5-8-1. Supply Reel Ass'y and Supply Reel Gear (See Fig. 5-8-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the BAND HOLDER ASS'Y as instructed in 5-7-3.
3) Set the PLAY mode with the mode selector (VHJ-0050).
4) Remove the special washer ①, then remove the SUPPLY REEL ASS'Y ② and the washer ③.
5) Remove the special washer ④.
6) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, remove the SUPPLY REEL GEAR ⑥ and the washer ⑦.

Note : Be sure that no dirt gets on the section where both brake shoes make contact.

2. Remounting

1) Apply a little oil (less than one drop) to the part of the axle ⑧ indicated by the arrow B, then mount the washer ⑦.
2) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, mount the SUPPLY REEL GEAR ⑥ onto the axle ⑧.
3) Mount the special washer ④ to the axle ⑧.
4) Apply 1 drop of oil to the part of the axle ⑨ indicated by the arrow C, then mount the washer ③.
5) Mount the SUPPLY REEL ASS'Y ② onto the axle ⑨.
6) Perform reel table height adjustment as instructed in 6-2-1.
7) Mount the special washer ① onto the axle ⑨.
8) Mount the BAND HOLDER ASS'Y as instructed in 5-7-3.
9) Perform tension pole position adjustment as instructed in 6-3.
10) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

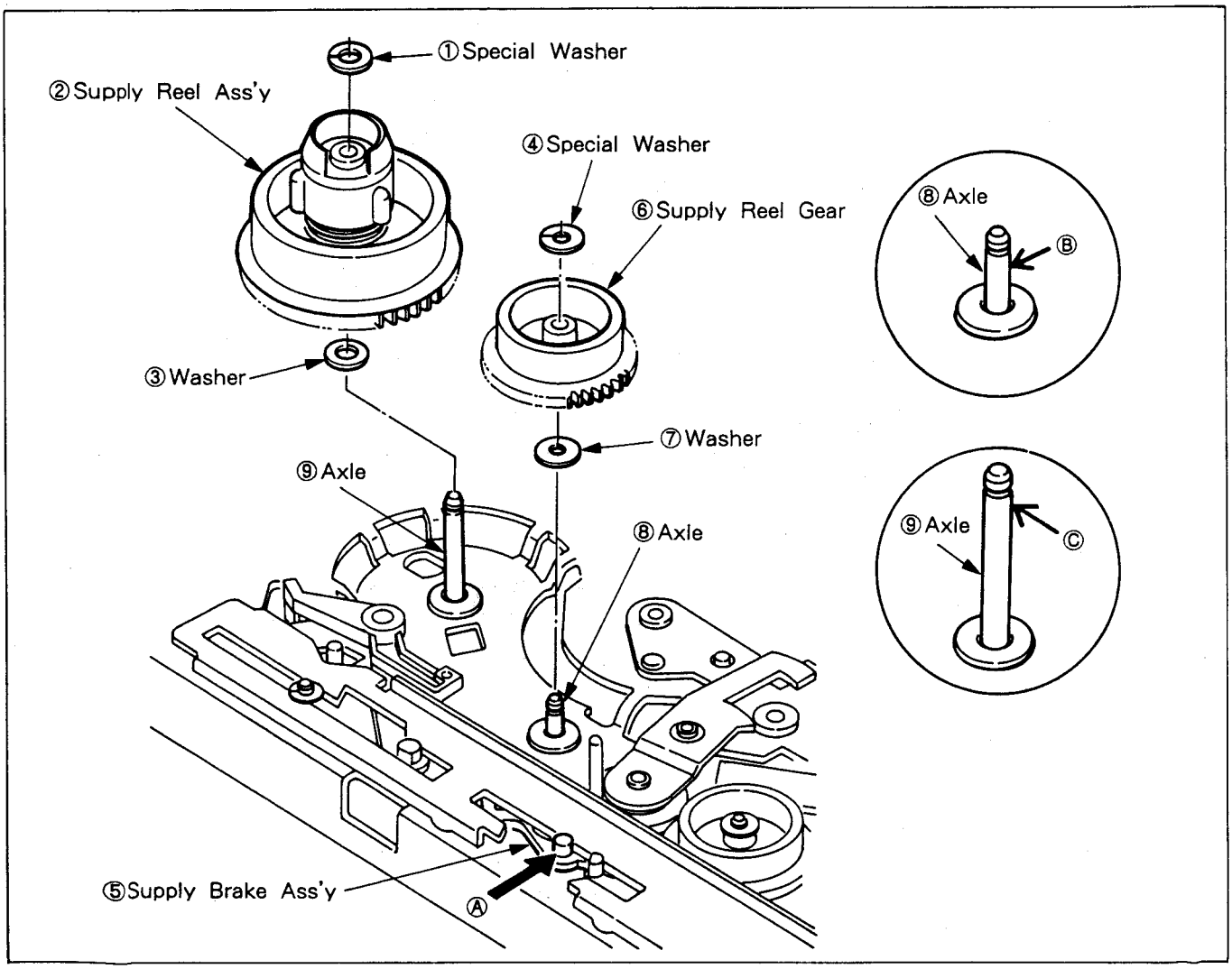


Fig. 5-8-1. Supply Reel Ass'y & Supply Reel Gear

5-8-2. Take-up Reel Ass'y (See Fig. 5-8-2.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the special washer ①.
3) Push the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A to release the brake, then remove the TAKE-UP REEL ASS'Y ③ and the washer ④.

Note : Be sure that no dirt gets on the section where both brake shoes make contact.

2. Remounting

1) Apply 1 drop of oil to the part of the axle ⑤ indicated by the arrow B, then mount the washer ④.
2) While pushing the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A, mount the TAKE-UP REEL ASS'Y ③ onto the axle ⑤.
3) Perform reel table height adjustment as instructed in 6-2.
4) Mount the special washer ① onto the axle ⑤.
5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

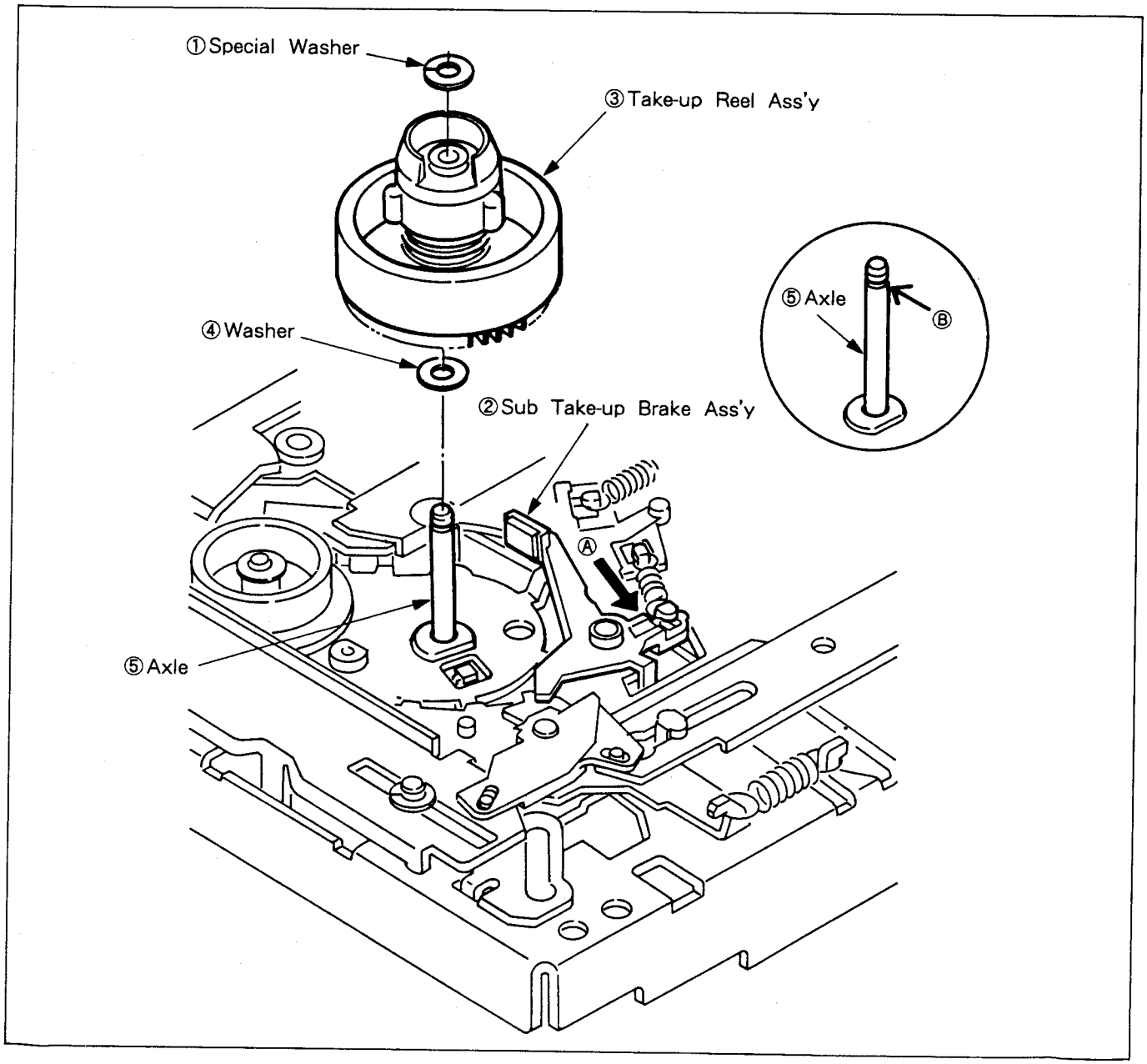


Fig. 5-8-2. Take-up Reel Ass'y

5-8-3. Take-up Reel Gear (See Fig. 5-8-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
3) Remove the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
4) Remove the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
5) Remove the special washer ①, then remove the TAKE-UP REEL GEAR ③ and the washer ④.

2. Remounting

1) Apply a little oil (less than one drop) to the part of the axle ⑤ indicated with an arrow.
2) Mount the washer ④ and the TAKE-UP REEL GEAR ③ onto the axle ⑤.
3) Mount the special washer ① onto the axle ⑤.
4) Mount the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
5) Mount the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
6) Mount the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
7) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

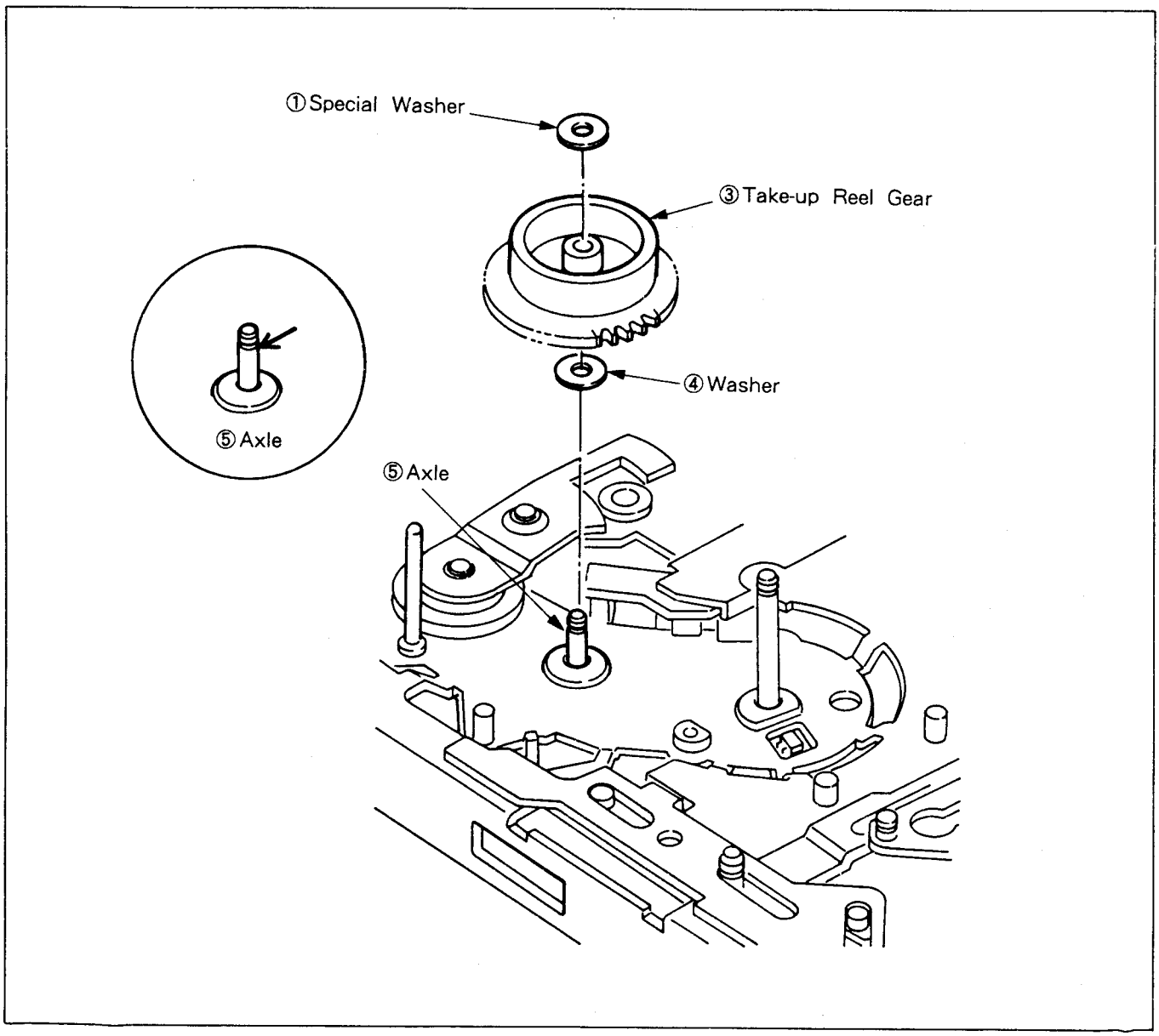


Fig. 5-8-3. TaKe-up Reel Gear

5-8-4. Reel Pulley and Friction Gear Ass'y (See Fig. 5-8-4.)

1. Removal

1) Remove the two screws ①, then remove the PULLEY BRACKET ②.
2) Remove the REEL DRIVE BELT ③.
3) Remove the special washer ④, then remove the REEL PULLEY ⑤.
4) Remove the special washer ⑥, then remove the FRICTION GEAR ASS'Y ⑦ and the washer ⑧.

2. Remounting

1) Apply one drop of oil to the parts of axles ⑨ and ⑩ indicated with an arrow.
2) Mount the washer ⑧ and the FRICTION GEAR ASS'Y ⑦ onto the axle ⑨.
3) Mount the special washer ⑥ onto the axle ⑨.
4) Mount the REEL PULLEY ⑤ onto the axle ⑩.
5) Mount the special washer ④ onto the axle ⑩.
6) Set the REEL DRIVE BELT ③.
7) Mount the PULLEY BRACKET ② with the two screws ①.

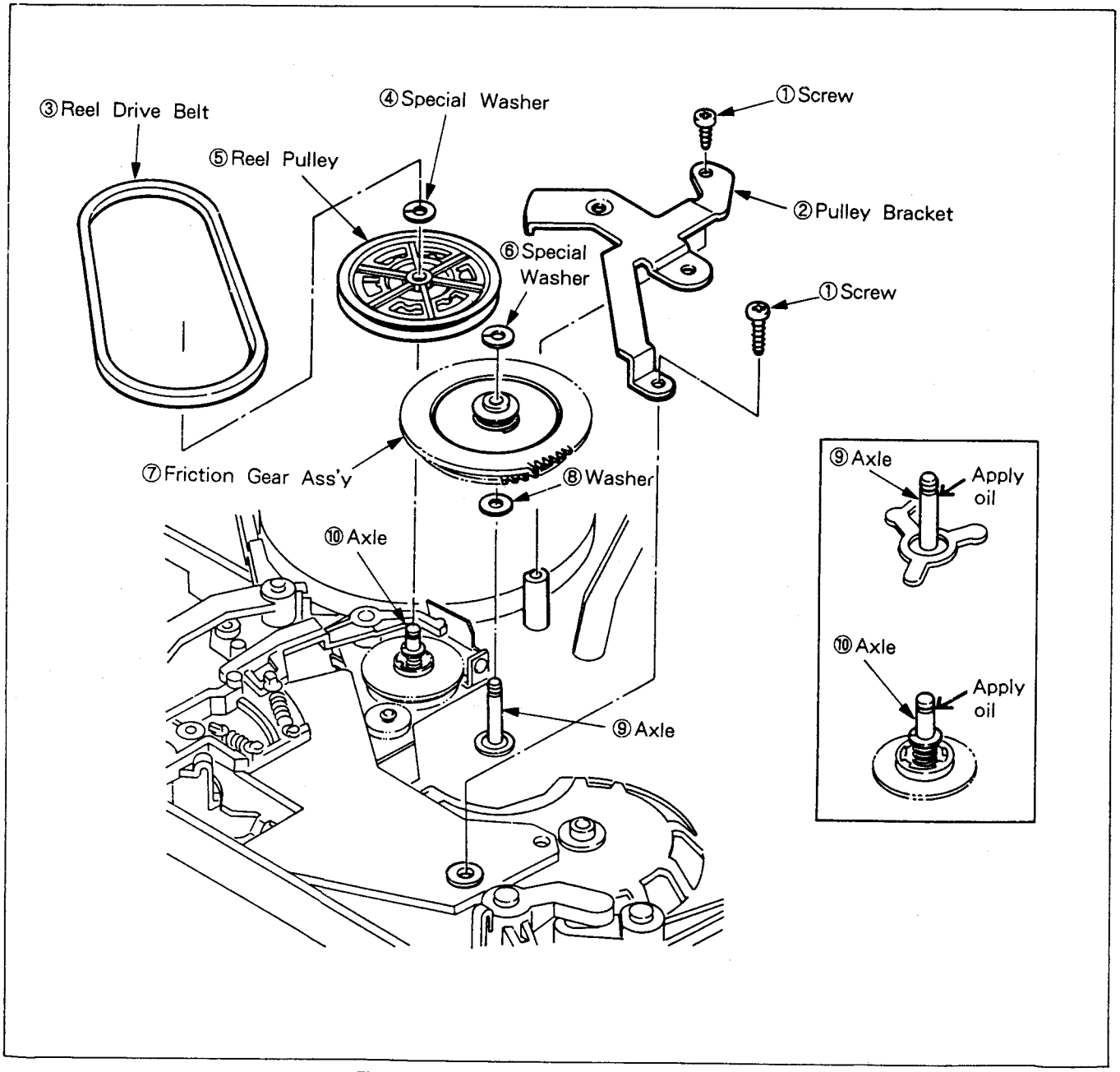


Fig. 5-8-4. Reel Pulley & Friction Gear

5-8-5. COMPL Clutch (See Fig. 5-8-5.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
3) Remove the screw ①, then remove the COMPL MC-4 ②.
4) Remove the two screws ③, then remove the COMPL CLUTCH ④.

2. Remounting

1) Mount the COMPL CLUTCH ④ with the two screws ③, aligning it with the protuberance ⑤.
2) After inserting the CN831 (COMPL MC-4) into the CN801 (COMPL MC-1), mount the COMPL MC-4 with the screw ①.
3) Mount the REEL PULLEY, the REEL DRIVE BELT and the PULLEY BRACKET as instructed in 5-8-4.
4) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

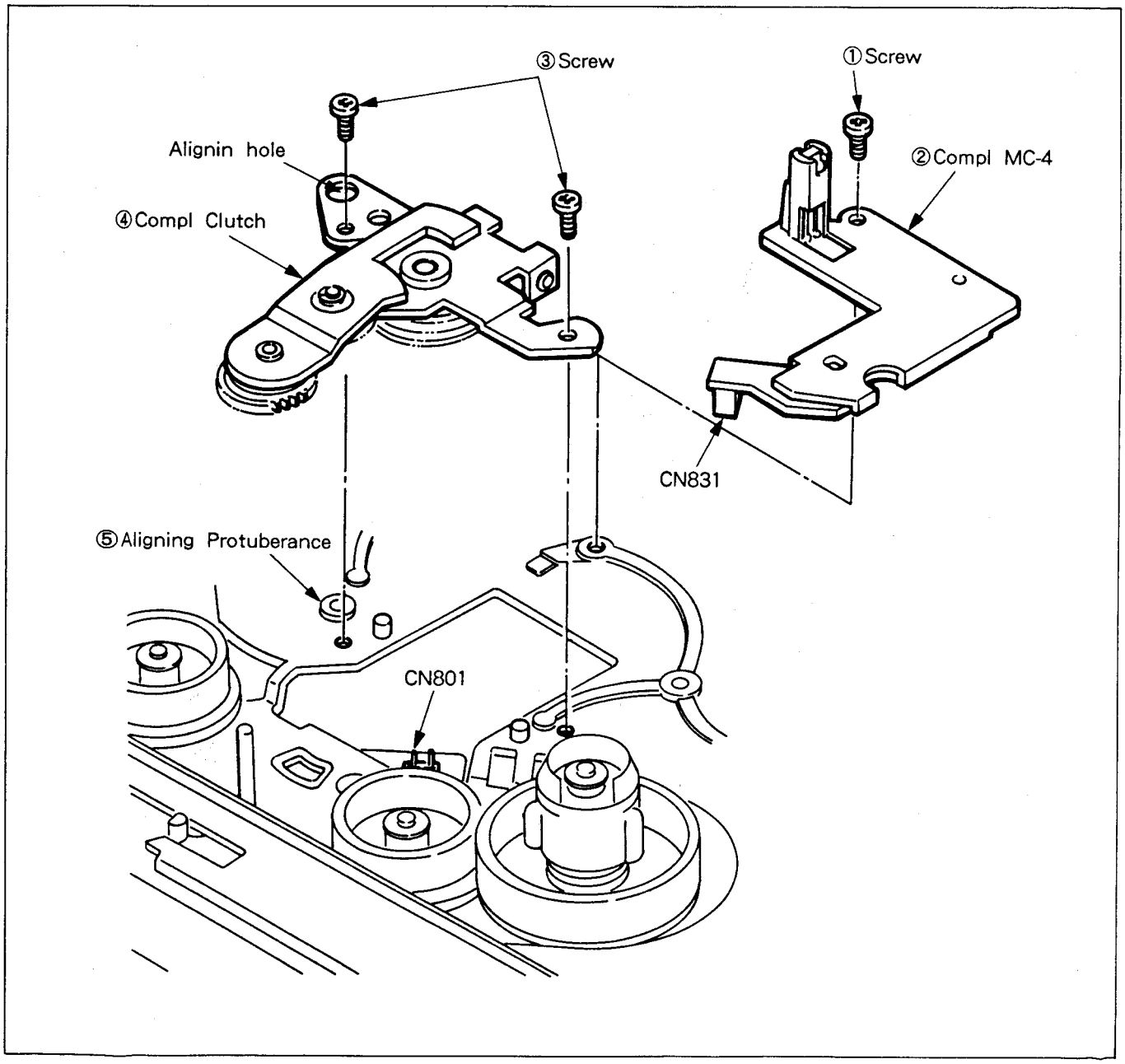


Fig. 5-8-5. Compl Clutch

5-8-6. Clutch Change Lever and Clutch Lever Ass'y (See Fig. 5-8-6.)

1. Removal

1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
2) Remove the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
3) Remove the SPRING COIL ①.
4) Unhook the hook ②, then remove the CLUTCH CHANGE LEVER ③.
5) Unhook the hook ⑤, then remove the CLUTCH LEVER ASS'Y ⑥.

2. Remounting

1) Mount the CLUTCH LEVER ASS'Y ⑥ onto the axle ⑦. Confirm that the hook ⑤ is hooked to the chassis.
2) Mount the CLUTCH CHANGE LEVER ③ onto the axle ⑧. Confirm that the hook ② is hooked to the chassis.
3) Hook the SPRING COIL ① between the hooks ⑨ and ⑩.
4) Mount the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

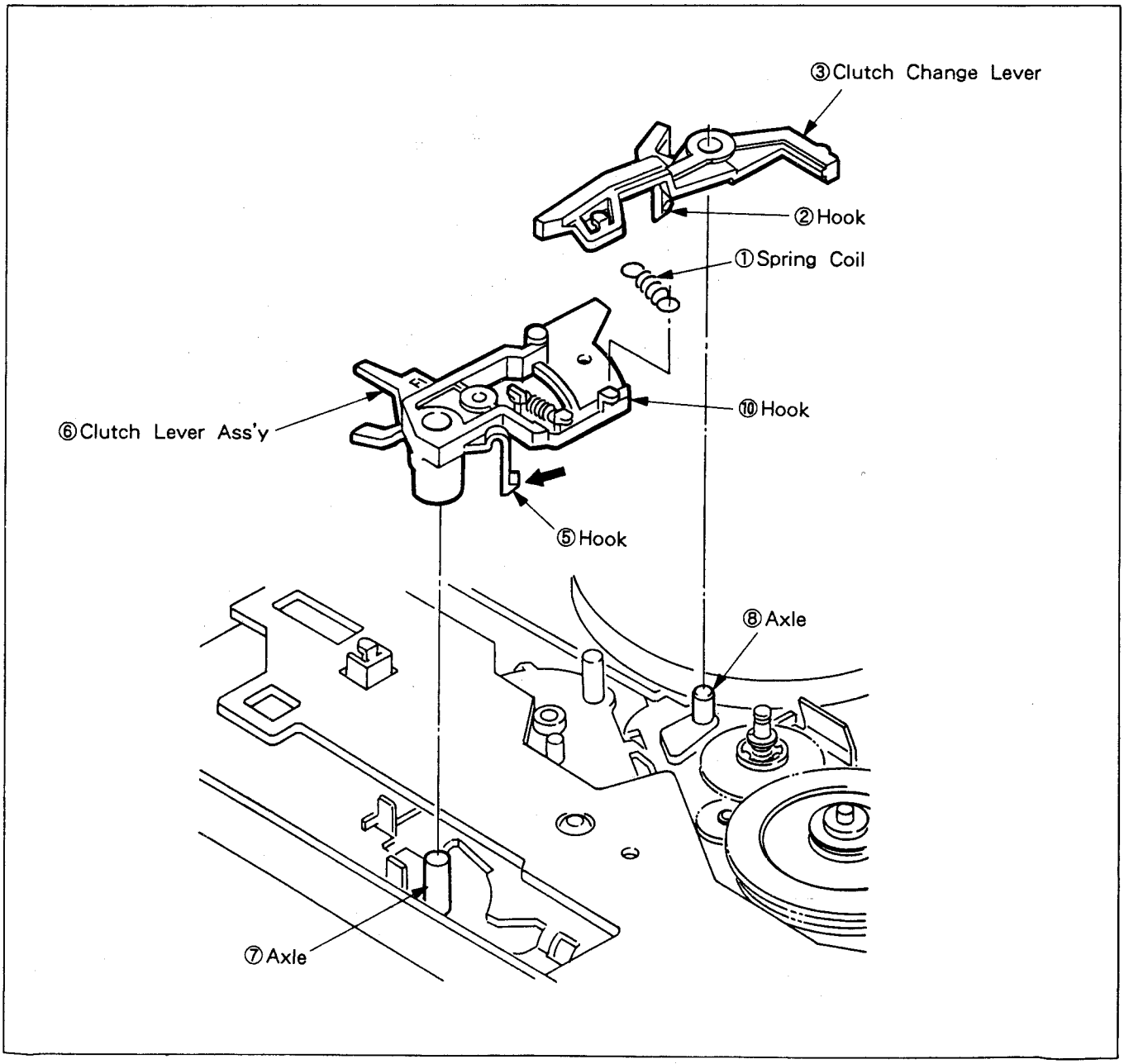


Fig. 5-8-6. Clutch Change Lever & Clutch Lever Ass'y

5-9. CAPSTAN MOTOR (See Fig. 5-9-1.)

1. Removal

1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
2) Remove the CAPSTAN MOTOR ⑥ connector.
3) Remove the REEL DRIVE BELT ② from the CAPSTAN MOTOR PULLEY ①.
4) Remove the two screws ④ fixing the COMPL CASSETTE MECHANISM TOP BOARD ③, then slide the TOP BOARD ③ backward.
5) Remove the three screws ⑤, then remove the CAPSTAN MOTOR ⑥.

Note : Take care not to scratch or soil the capstan axle.

2. Remounting

1) Mount the CAPSTAN MOTOR ⑥ with the three screws ⑤.
2) Connect the CAPSTAN MOTOR ⑥ connector.
3) Mount the TOP BOARD ③ with the two screws ④.
4) Fit the REEL DRIVE BELT ② around the CAPSTAN MOTOR PULLEY ① and the REEL PULLEY ⑦.
5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

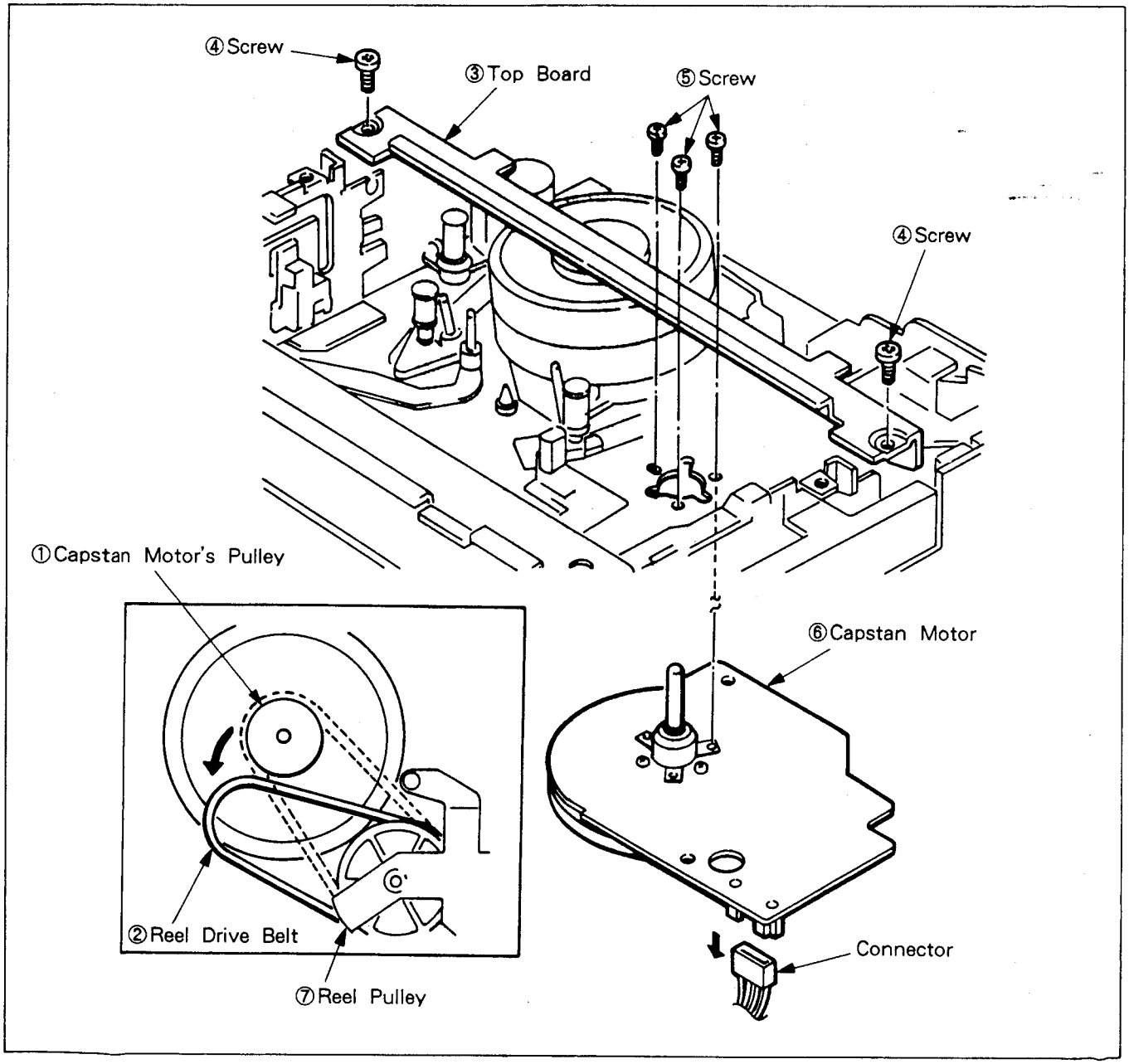


Fig. 5-9-1. Capstan Motor

5-10. FIXED GUIDE, FE HEAD LEVER ASS'Y

5-10-1. Entrance side Fixed Guide and FE Lever Ass'y (See Fig. 5-10-1.)

1. Removal

1) Remove the SP NUT ①, then remove the GUIDE PIPE ③ and the SP washer ② (lower), in that order.
2) Remove the SPRING COIL ⑤.
3) Remove the FTE HEAD connector.
4) Remove the special washer ⑥, then remove the FE HEAD LEVER ASS'Y ⑦.

Note : A SP washer ⑪ (upper) and a SPRING COIL ④ are sometimes inserted between the SP NUT ① and the special washer ⑥. In this case, put it back in its original position when remouting the entrance side fixed guide.

2. Remounting

1) After mounting the FE LEVER ASS'Y ⑦ onto the axle ⑧, mount the special washer ⑥.
2) Hook the SPRING COIL ⑤ between the chassis notch ⑨ and the FE LEVER ASS'Y hook ⑩.
3) Mount the SP washer ② (lower), the GUIDE pipe ③ and the SP NUT ① to the axle ⑧, in that order.
4) Connect the connector to the FTE HEAD.
5) Perform hight adjustment of the entrance side fixed guide (S) as instructed in 6-4 when remounted the SPRING COIL ④ and the SP washer ⑪ (upper).

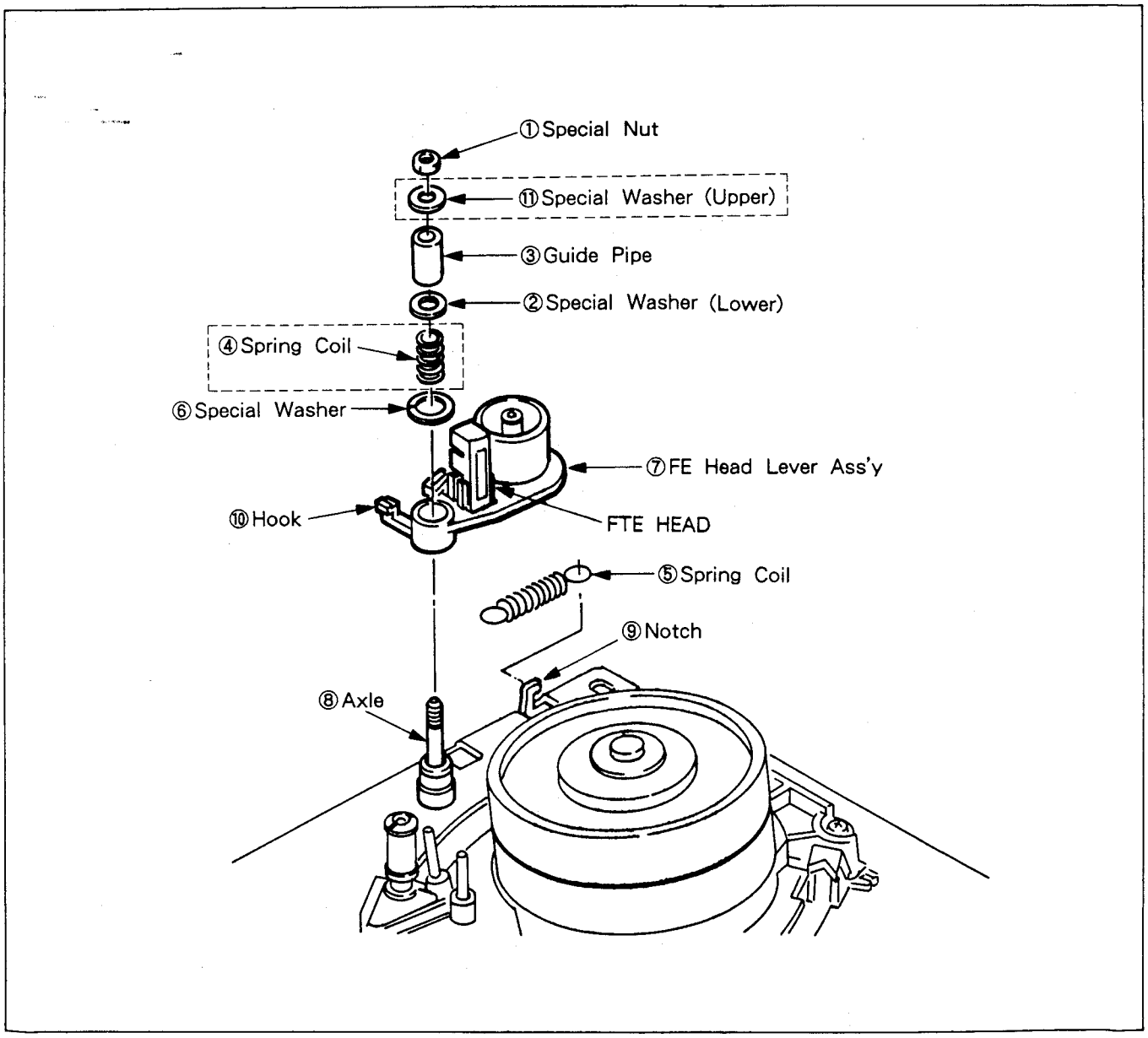


Fig. 5-10-1. Fixed Guide (S) & FE Lever Ass'y

5-10-2. Impedance Roller, FTE Head (See Fig. 5-10-2.)

1. Removal

1) Remove the FTE HEAD (full track erase head) ① connector.
2) Remove the special washer ②, then remove the IMPEDANCE ROLLER ③ and the washer ④.
3) Open the hook ⑤ a little and remove the FTE HEAD ①.

Note : Take care not to open the hook too much, otherwise it may be deformed or broken.

2. Remounting

1) Mount the FTE HEAD ① onto the FE HEAD LEVER ASS'Y ⑥. Confirm that the hook ⑤ is hooked to the FTE HEAD ①.
2) Mount the washer ④ and the IMPEDANCE ROLLER ③, in that order, onto the axle ⑦, then mount the special washer ②.
3) Connect the connector to the terminal of the FTE HEAD ①.

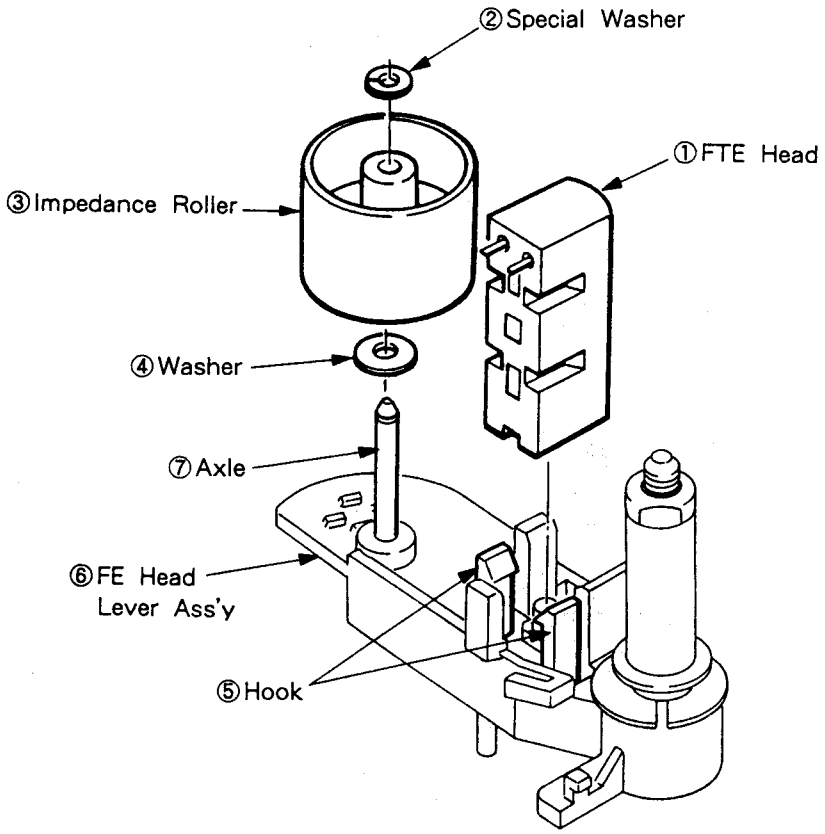


Fig. 5-10-2. Impedance Roller & FTE Head

5-10-3. Exit side Fixed Guide (See Fig. 5-10-3.)

1. Removal

1) Remove the CAP ①.
2) Remove the SP NUT ②, then remove the SP washer ③ (upper), the GUIDE PIPE ④, the SP washer ③ (lower) and the SPRING COIL ⑤, in that order.

2. Remounting

1) Mount the SPRING COIL ⑤, the SP washer ③ (lower), the GUIDE PIPE ④, the SP washer ③ (upper) and the SP NUT ②, in that order, to the axle ⑥.
2) Mount the CAP ① onto the axle ⑥.
3) Perform height adjustment of the fixed guide (T) as instructed in 6-4.

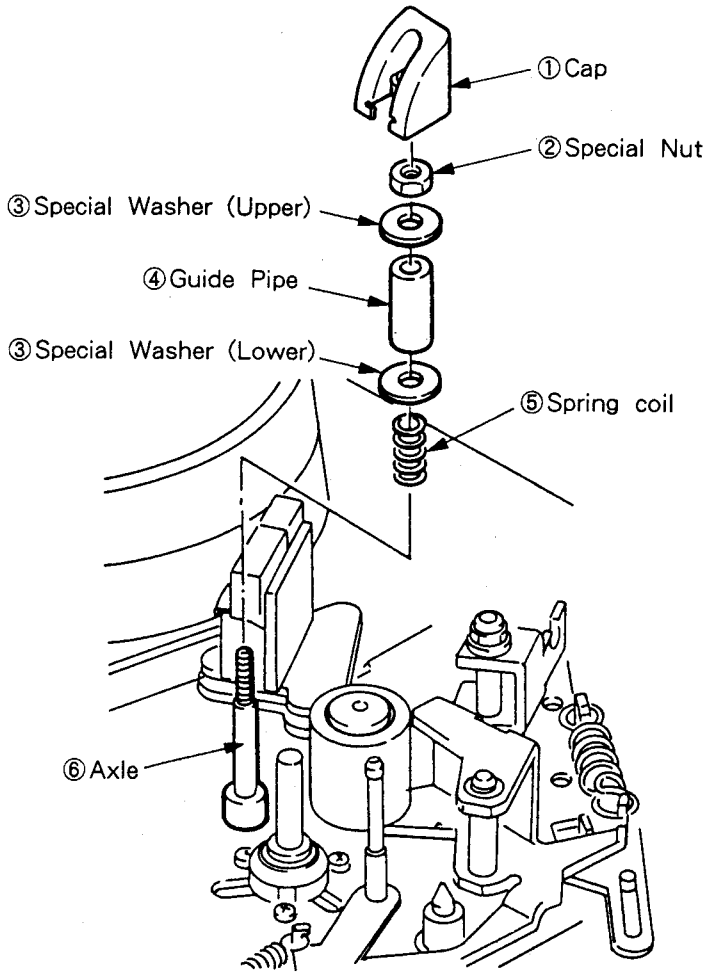


Fig. 5-10-3. Fixed Guide (T)

5-11. DRUM SECTION

5-11-1. Drum Motor (rotor, stator) (See Fig. 5-11-1.)

1. Removal

1) Remove the screw ①, then remove the CYLINDER EARTH ASS'Y ②.
2) Remove the two screws ③, then remove the ROTOR ④ and SPACER.
3) Remove the STATOR board connector ⑩.
4) Remove the three screws ⑤, then remove the STATOR ⑥.

2. Remounting

1) Mount the STATOR ⑥ with the three screws ⑤.
2) Mount the SPACER ⑪ on to the AXLE ⑫.
3) While aligning the ROTOR oval hole ⑦ with the ROTOR DISK hole ⑧, mount the ROTOR with the two screws ③.
4) Insert the connector ⑩.
5) While aligning the CYLINDER EARTH ASS'Y ② protuberance with the chassis hole ⑨, mount it with the screw ①.

Note 1 : Use a torque driver (VHJ-0014) for mounting the STATOR ⑥ and the ROTOR ④. Set fastening torque to 3kg-cm.

Note 2 : When the drum unit has been replaced, perform a tape path adjustment as instructed in 6-4. and perform a CH-1/CH-2 switching position adjustment of the servo circuit.

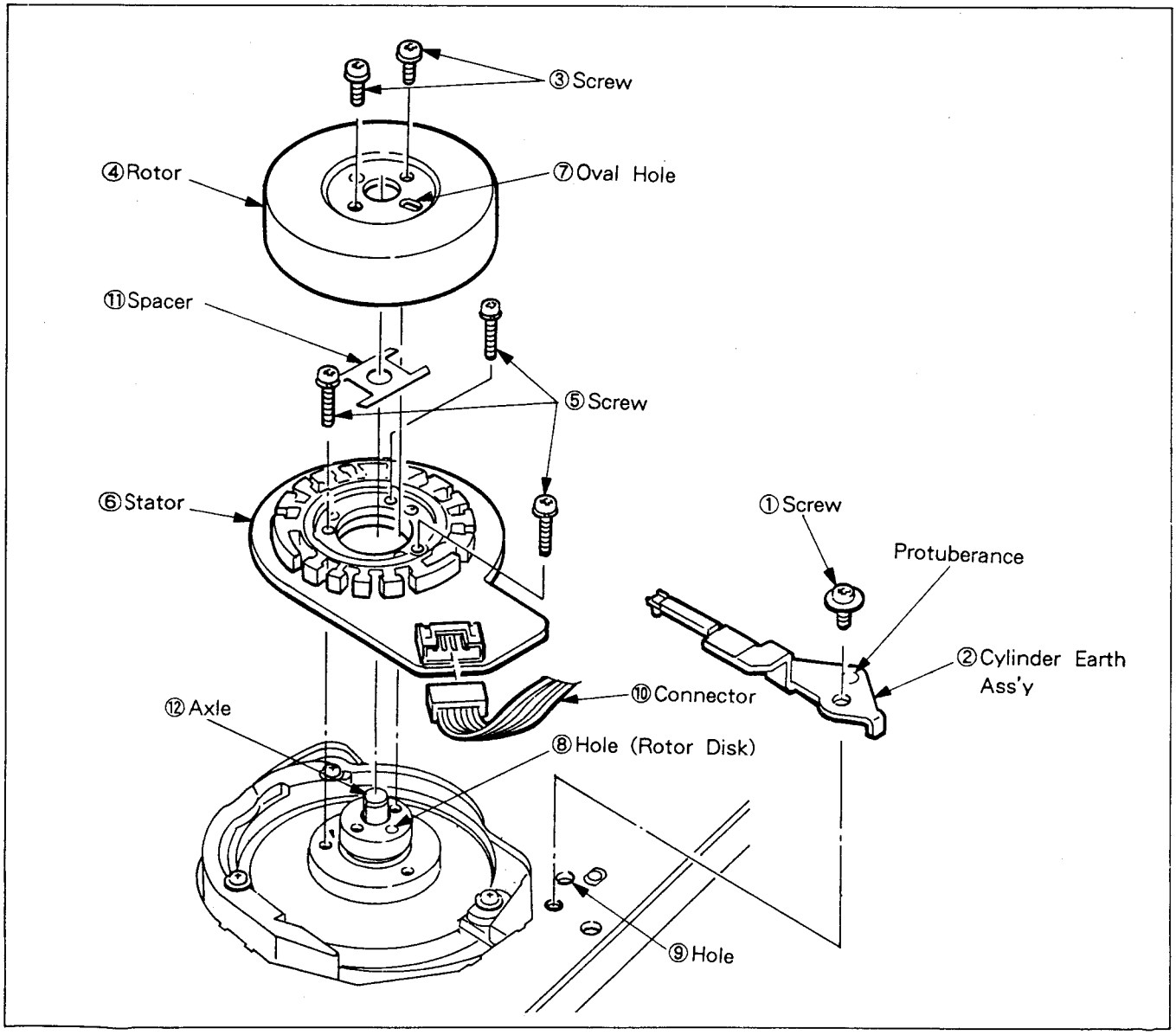


Fig. 5-11-1. Drum Motor

5-11-2. Drum Unit (See Fig. 5-11-2.)

1. Removal

1) For some models with the board located above the upper drum, remove the board.
2) Remove the flexible P.C.B. ① from the PRE-AMP UNIT (take care not to pull the flexible P.C.B. in the upward direction).
3) Remove the LOAD RACK only, as instructed in 5-4-1.
4) Remove the three screws ②, then remove the drum unit ③.

NOTE : When removing and remounting the drum unit, handle it carefully to protect it from scratches and dirt.

2. Remounting

1) While aligning the drum unit ③ to the protuberance, mount it to the drum base (CYLINDER BASE) ⑤ with the three screws ②.
2) Mount the ROAD RACK as instructed in 5-4-1.
3) Insert the flexible P.C.B. into the PRE-AMP UNIT.
4) Clean the drum unit.
5) Perform the tape path adjustment as instructed in 6-4. and perform the CH-1/CH-2 switching position adjustment of the servo circuit.

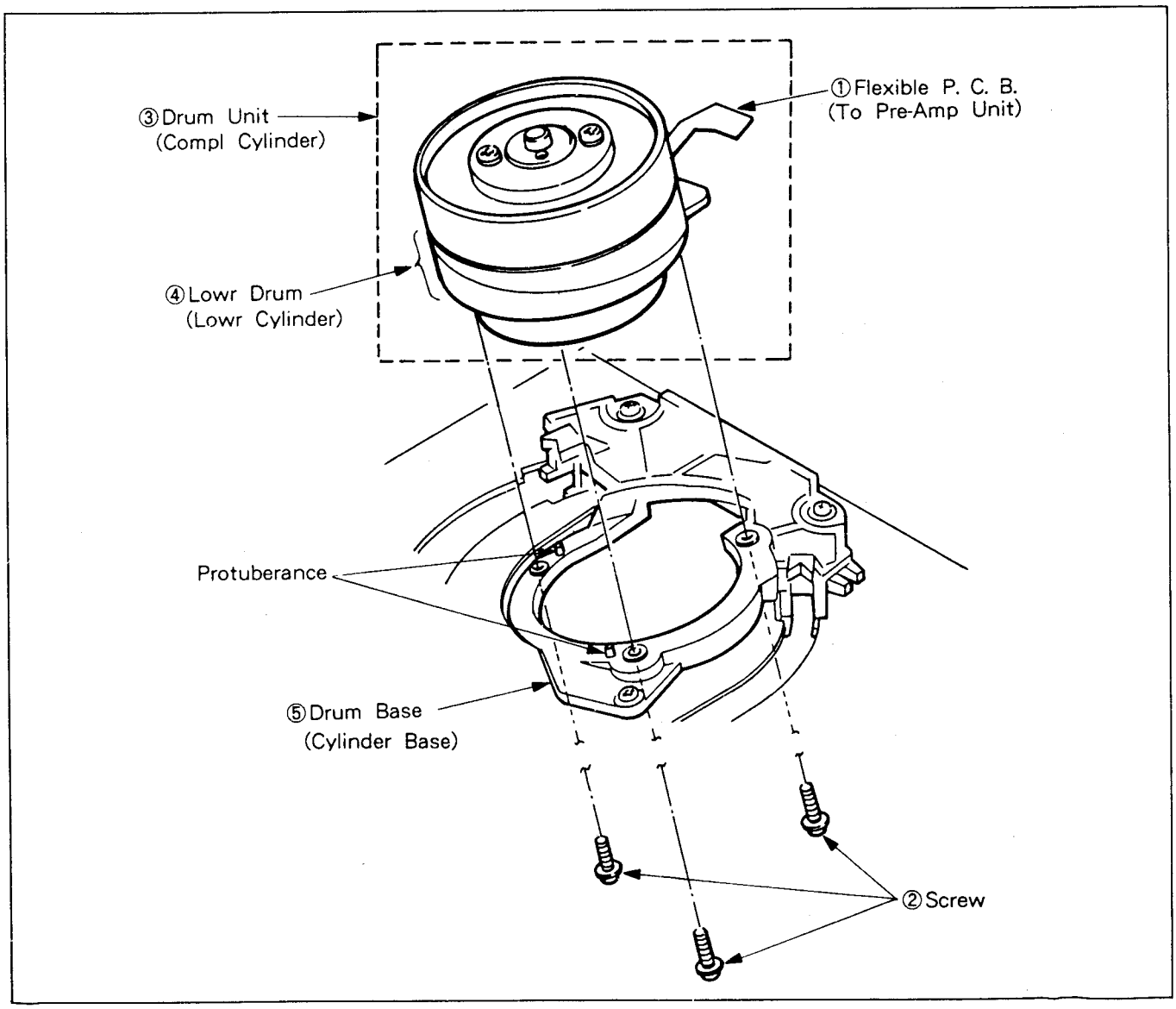


Fig. 5-11-2 Drum Unit (Compl Cylinder)

5-11-3. Upper Drum (Upper Cylinder)

1. Removal

1) Remove the two screws ① (see Fig. 5-11-3).
2) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum (UPPER CYLINDER), remove the lead wires soldered from the P.C. board (see Fig. 5-11-4.).
3) Turn the head removing jig (VHJ-0041) handle ② counterclockwise to lift up the stopper ③ (see Fig. 5-11-5.).
4) Insert the two long screws ④ of the jig into the screw holes ⑥ located on the head chip side of the upper drum (UPPER CYLINDER) ⑤, then mount by turning the handle clockwise.
5) While holding the jig so that the upper drum ⑤ does not rotate, turn the handle ② clockwise to remove the upper drum.
6) Remove the jig from the upper drum.

Note : Handle parts carefully to protect the drum from scratches and dirt, and the video head from damage.

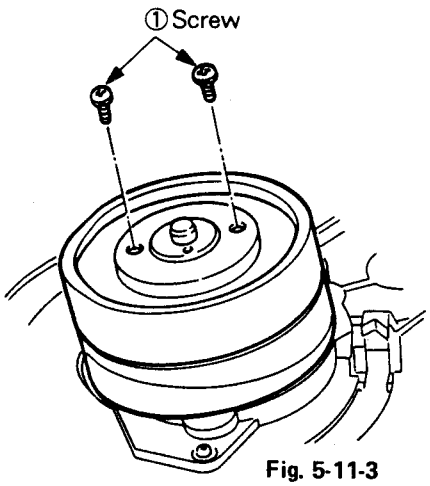


Fig. 5-11-3

Lead wires of
Rotary Erase Head (Model for flying erase capability)

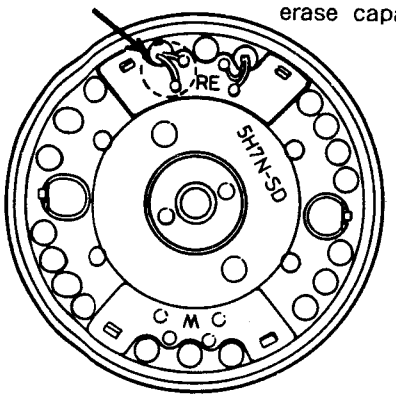


Fig. 5-11-4

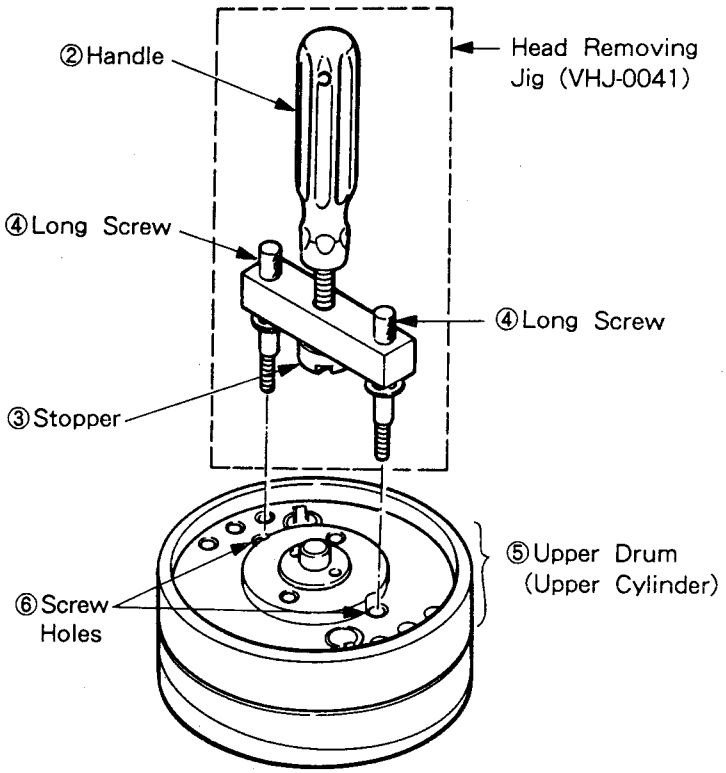


Fig. 5-11-5

Upper Drum (Upper Cylinder)

2. Remounting (See Fig. 5-11-6.)

1) Confirm that surfaces where the flywheel and the upper drum (UPPER CYLINDER) are engaged or make contact portion are free from scratches and dirt.
2) The code name ① of the drum is printed on the video head side of the upper drum ⑤ SP CH-1 (channel A, plus azimuth). The code name ① is set with in the rotary transformer terminal round hole side ② position of lower drum (LOWER CYLINDER), so that the two screw holes ③ of the upper drum are aligned with the two screw holes ④ of the flywheel. (Refer to 3. Recognizing the SP CH-1 Head side).
3) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum, pass the lead wires through the lead wire hole. (See Fig.5-11-4.)
4) While keeping the upper drum ⑤ parallel to the lower drum (LOWER CYLINDER) ⑧, insert it completely into the flywheel.
5) Temporarily tighten the two screws ⑦ alternately a little at a time, then tighten them to a torque of 6kg-cm using a torque driver (VHJ-0014) and a 3mm bit (VHJ-0045).
6) In case the RE head is attached to the upper drum ⑤, solder the lead wires to the P.C. board. Solder the red lead wire to the R terminal, and the yellow lead wire to the Y terminal.

Note : When the upper drum has been replaced, perform a tape path adjustment as instructed in 6-4. and CH-1/CH-2 switching position adjustment of the servo circuit.

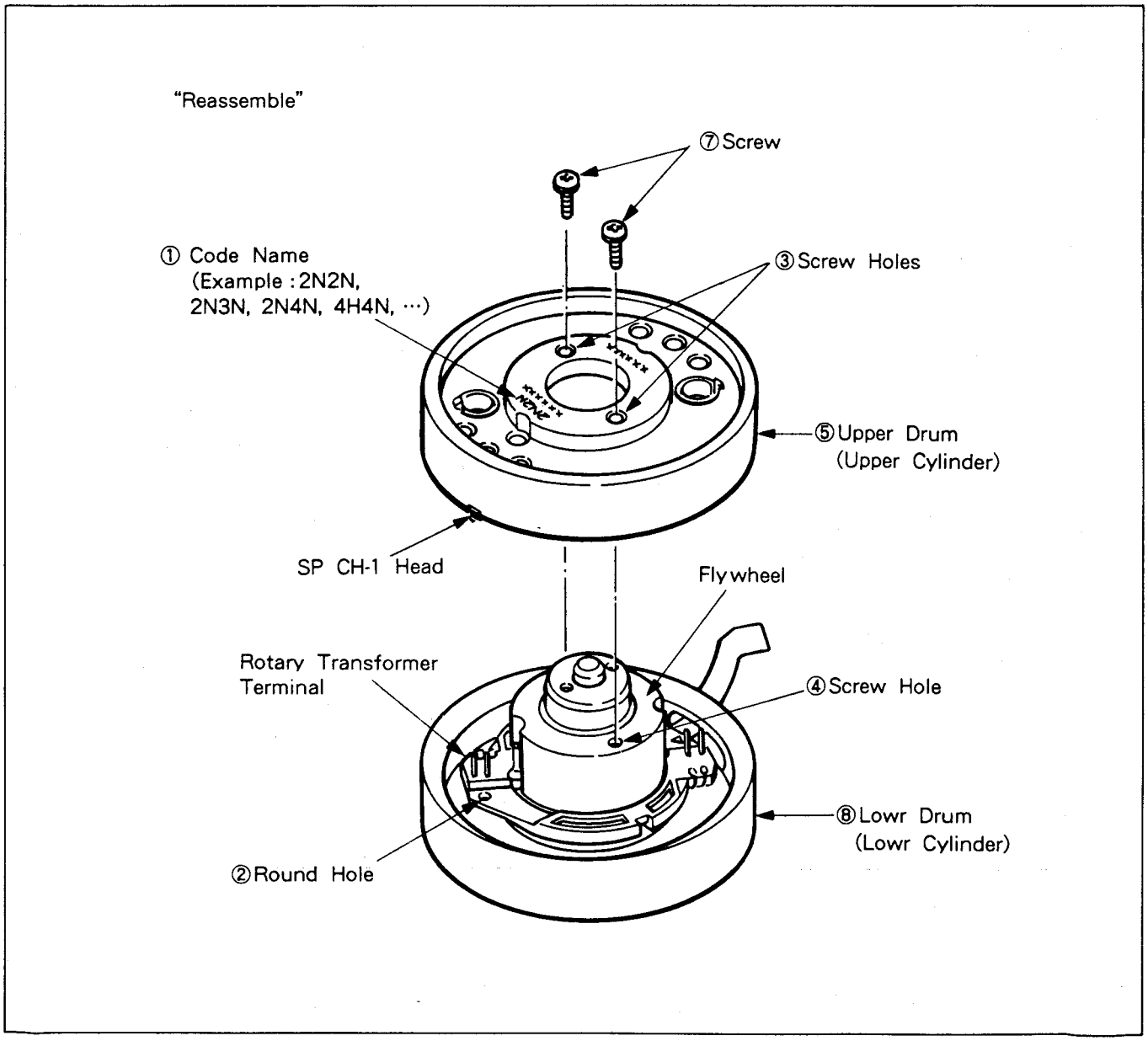


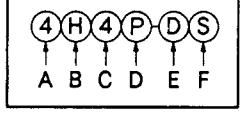
Fig. 5-11-6.

3. Recognizing the SP CH-1 Head Side

No playback picture can be obtained if the video head is not wired as a pair with the rotary transformer located inside the lower drum rotating section. Therefore, mounting position should be matched when mounting the upper drum. In the P90 mechanism series, the code name of the drum is printed on the SP CH-1 (CH-A, plus azimuth) side as a mark for mounting the upper drum. (See Fig. 5-11-7.) This code name differs according to the drum type, but its basic form is as follows :

A = Number of head bases
B = "N" for normal audio
"H" for HI-FI audio
C = Number of heads
D = TV system ("N" or "P")
EF = Code for detailed classification. Depending on drum type, it can also be just one character, or a blank space.

Code Name Form



Examples of Detailed Classification Codes
V = Head with level difference
D = Compatible with digital units
S = SVHS-compatible

Examples of Code Names
2N2P, 2N2P-L, 2N2P-V, 2N2P-D, 2N3P, 2N4P, 4H4P, 4H4P-D

Moreover, there is a round hole with marking purposes on the SP CH-1 (CH-A, plus azimuth) side of the lower drum rotary transformer terminal. As shown in Fig. 5-11-8, there are two types of rotary transformer terminals (the number of pins differs according to the number of heads).

Note : When ordering parts such as drums (CYLINDERS), do not use the code names ; always refer to the parts list and order with the specified part numbers.

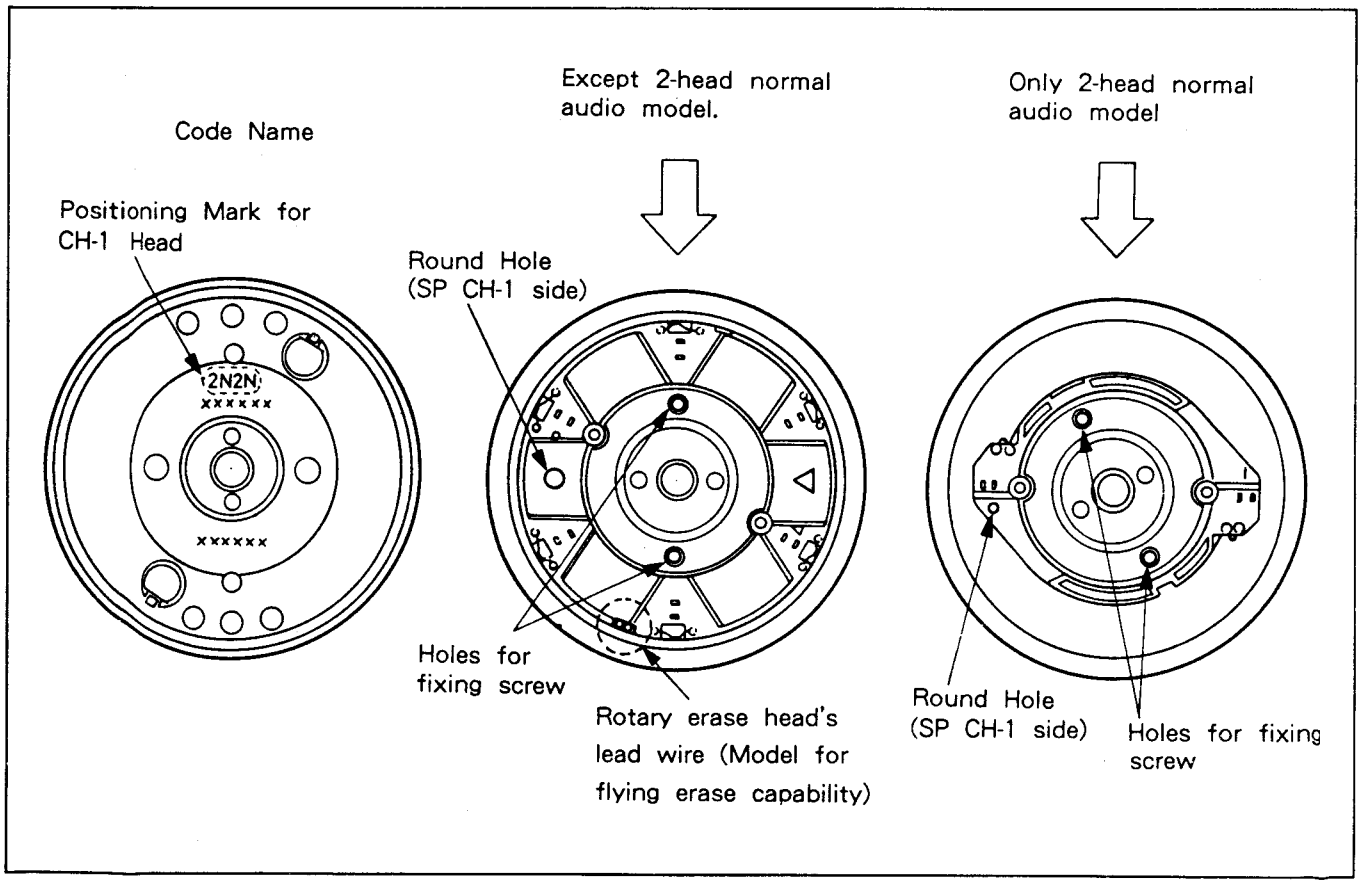
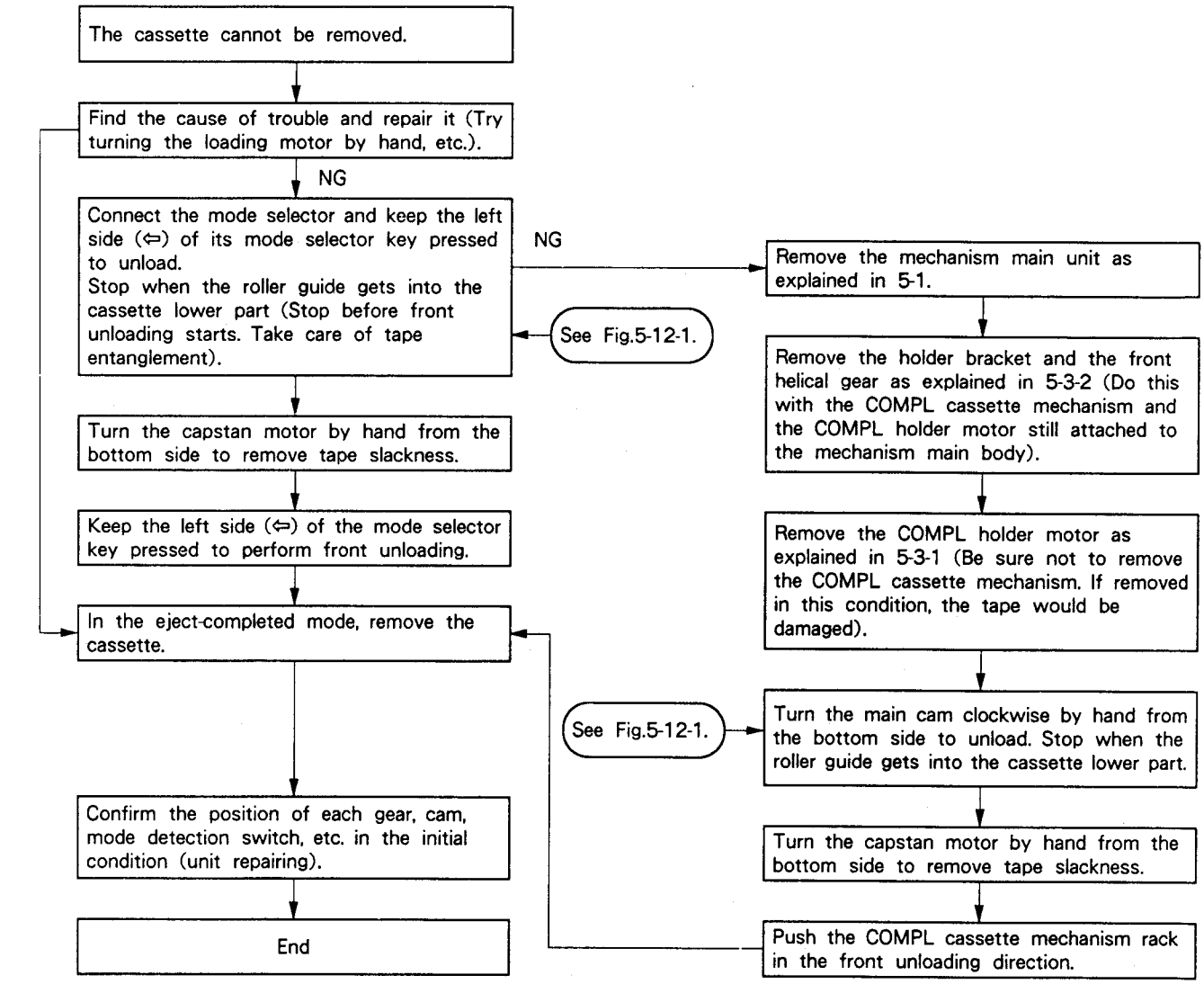

Except 2-head normal audio model.
Only 2-head normal audio model
Code Name
Positioning Mark for CH-1 Head
Round Hole (SP CH-1 side)
2N2N
Holes for fixing screw
Rotary erase head's lead wire (Model for flying erase capability)
Round Hole (SP CH-1 side)
Holes for fixing screw

Fig. 5-11-7. Upper Drum

Fig. 5-11-8. Lower Drum

5-12. HOW TO PROCEED WHEN THE CASSETTE CANNOT BE REMOVED


The cassette cannot be removed.
Find the cause of trouble and repair it (Try turning the loading motor by hand, etc.).
NG
Connect the mode selector and keep the left side (⇦) of its mode selector key pressed to unload.
Stop when the roller guide gets into the cassette lower part (Stop before front unloading starts. Take care of tape entanglement).
NG
Remove the mechanism main unit as explained in 5-1.
See Fig.5-12-1.
Remove the holder bracket and the front helical gear as explained in 5-3-2 (Do this with the COMPL cassette mechanism and the COMPL holder motor still attached to the mechanism main body).
Turn the capstan motor by hand from the bottom side to remove tape slackness.
Remove the COMPL holder motor as explained in 5-3-1 (Be sure not to remove the COMPL cassette mechanism. If removed in this condition, the tape would be damaged).
Keep the left side (⇦) of the mode selector key pressed to perform front unloading.
In the eject-completed mode, remove the cassette.
See Fig.5-12-1.
Turn the main cam clockwise by hand from the bottom side to unload. Stop when the roller guide gets into the cassette lower part.
Turn the capstan motor by hand from the bottom side to remove tape slackness.
Push the COMPL cassette mechanism rack in the front unloading direction.
Confirm the position of each gear, cam, mode detection switch, etc. in the initial condition (unit repairing).
End

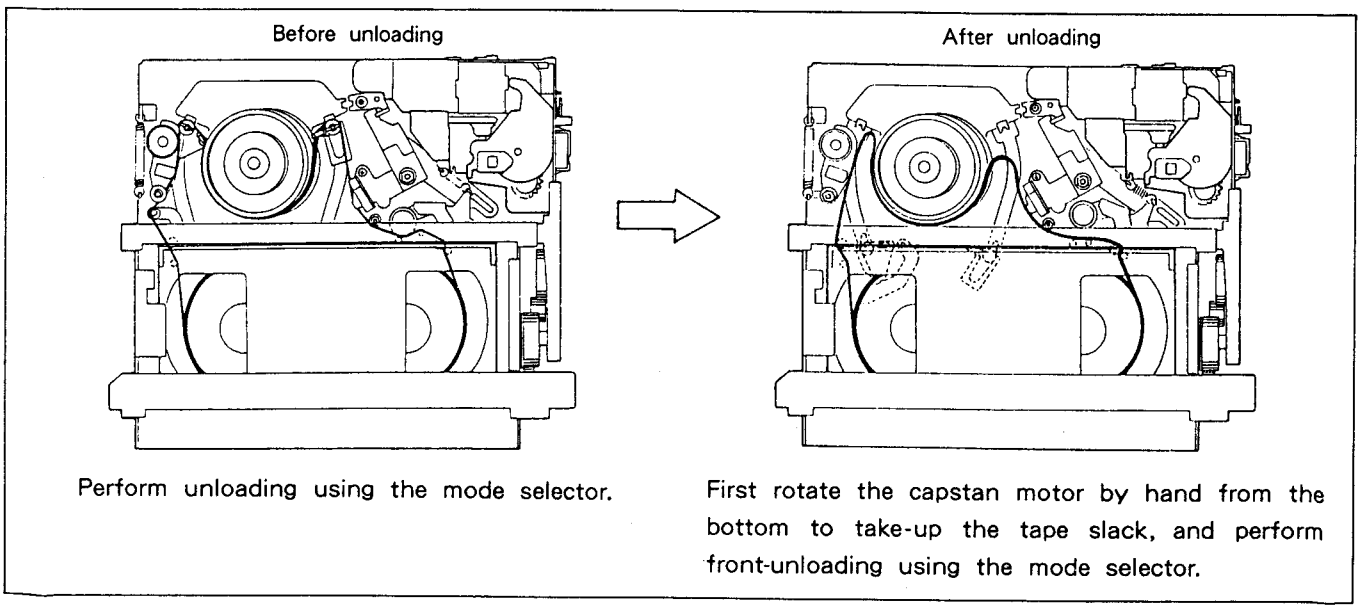

Before unloading
After unloading
Perform unloading using the mode selector.
First rotate the capstan motor by hand from the bottom to take-up the tape slack, and perform front-unloading using the mode selector.

Fig. 5-12-1

6. MECHANISM ADJUSTMENT

6-1. OPERATING THE MECHANISM WITH NO CASSETTE INSERTED (See Fig. 6-1-1.)

1) Attach black vinyl tape to the T. END and T. TOP sensors to prevent light from entering.
2) Push the TRAY LOCK LEVER in the direction of the arrow to maintain the unlocked condition. Release the lever just before the TRAY starts moving down.
3) In this condition, operation is possible in every mode. However, the following procedures are necessary to operate the unit in the REC, REW and R-SEARCH modes.

REC mode : Push the SAFETY SW LEVER to turn the SAFETY SWITCH (Erasure Prevention Switch) ON, then press the REC button. If the SAFETY SWITCH is not turned ON, the unit will enter the EJECT mode.

REW/R-SEARCH : After pressing the REW button, turn the TAKE-UP REEL ASS'Y by hand. Otherwise, the reel sensor will operate, setting the INITIAL mode after 2 to 3 seconds.

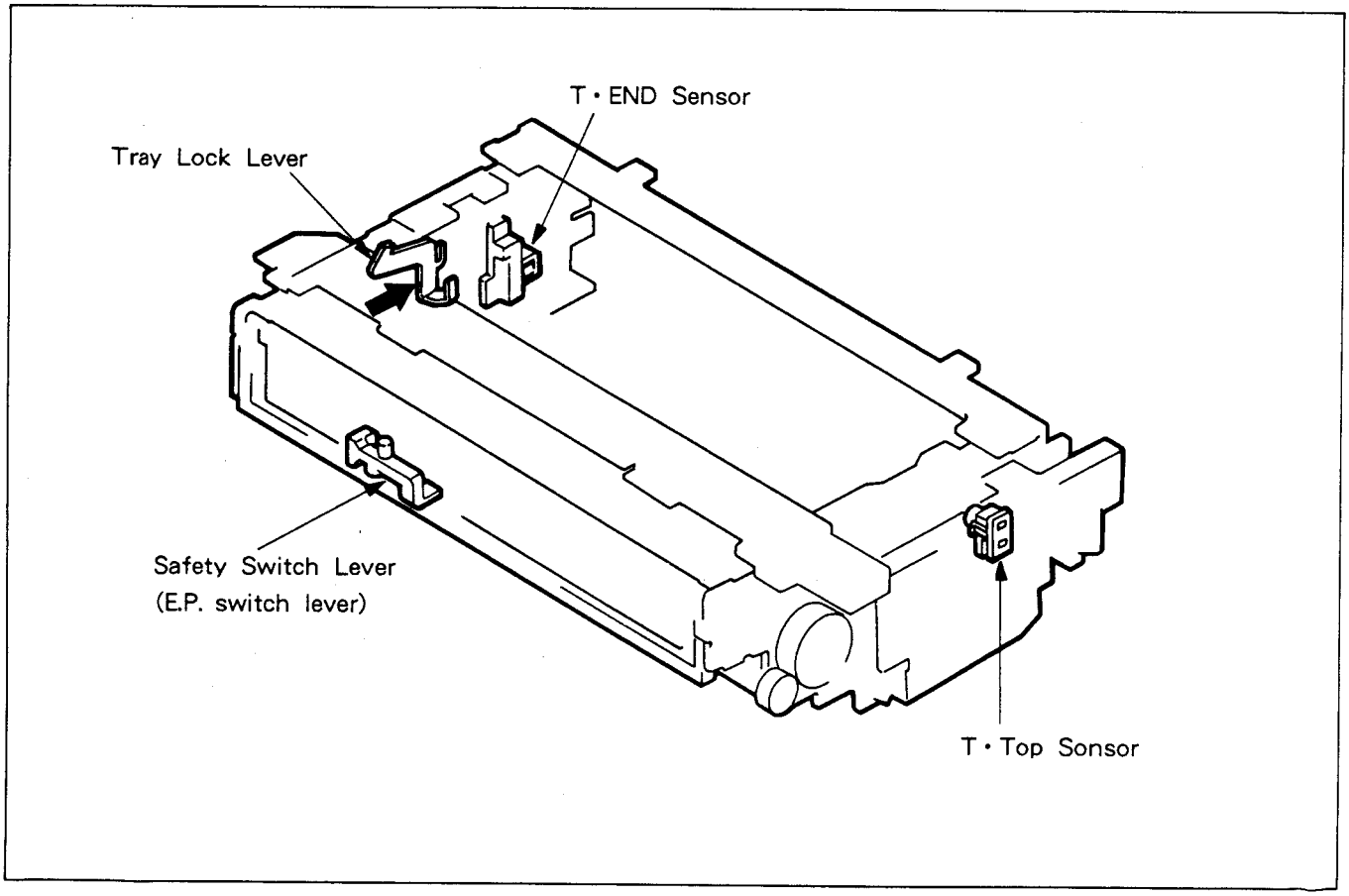


Fig. 6-1-1. Preparations for Adjustment

6-2. REEL TABLE HEIGHT ADJUSTMENT AND TORQUE CHECK

6-2-1. Reel Table Height (See Fig. 6-2-1.)

If the SUPPLY REEL ASS'Y or the TAKE-UP REEL ASS'Y is raplaced, it will be necessary to adjust the REEL TABLE height.

(1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.
(2) Attach the master plane (H-7099-279-H) and reel disc height jig (H-7099-038-H) in the direction of the arrows.
(3) Confirm that, when the gauge stops, the REEL TABLEs are not in contact with surface A of the plate and side of the REEL TABLEs are in contact with surface B.
(4) If the REEL TABLE is in contact with surface A, remove a spacer and check again.
(5) If the REEL TABLE is not in contact with surface B, add a spacer and check again.
(6) Remove the master plane.
(7) Set the EJECT mode with the mode selector.
(8) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.

Note:

- Adjust the reel table height by adding or removing spacers(0.13t, 0.25t, 0.3t, 0.4t and 0.5t)as appropriate so that the height meets the specifications. Use the same method for both the TAKE-UP REEL TABLE and the SUPPLY REEL TABLE.
  (The 0.5t washer is included as the standard washer for the SUPPLY REEL ASS'Y. The 0.4t washer is included as the standard washer for the TAKE-UP REEL ASS'Y.)
- If the height of the reel table is not within the specified value, the tape edge might be damaged as a result, or the tape path adjustment might not be possible to make.

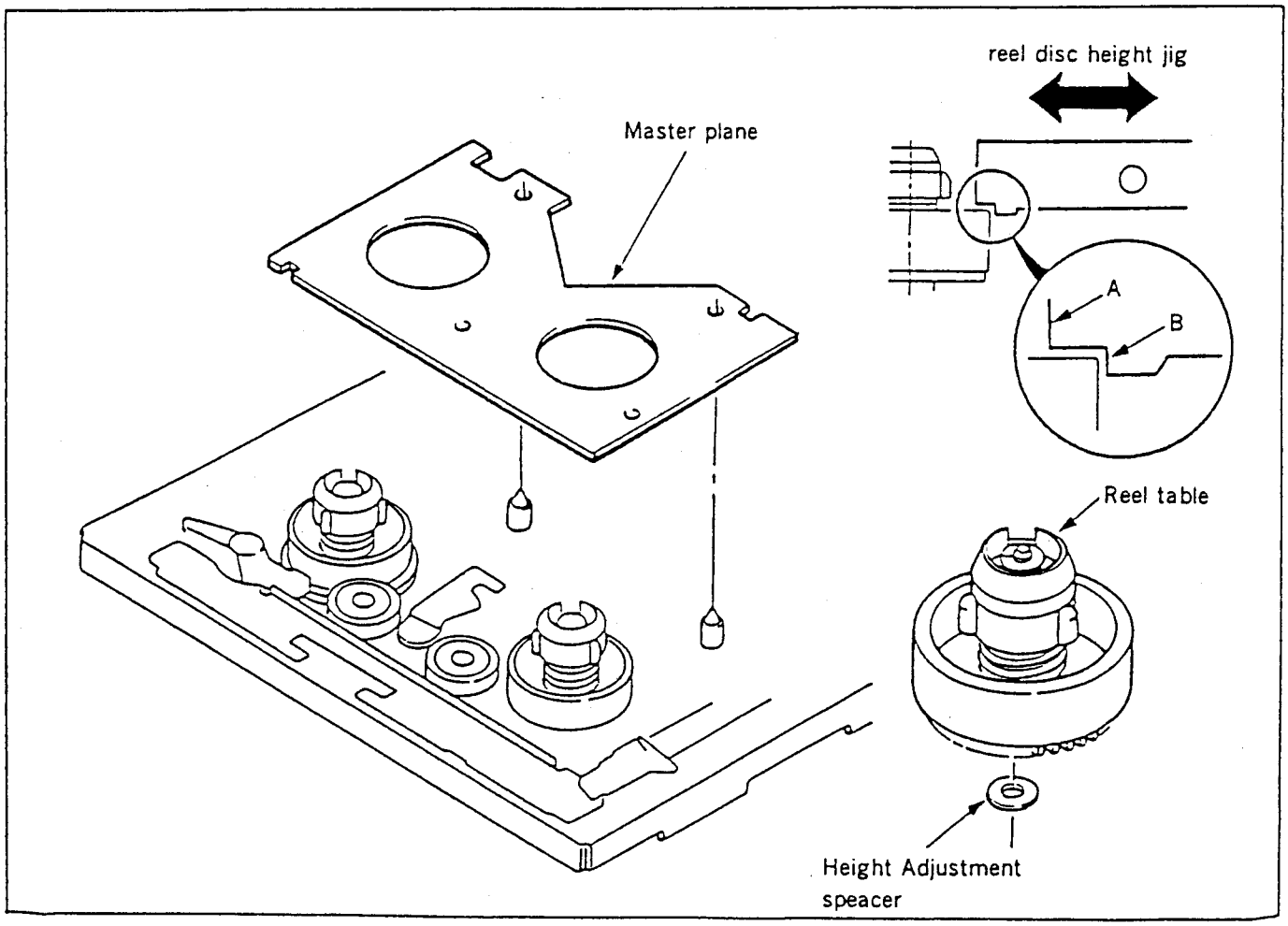


Fig. 6-2-1. Reel Table Height Adjustment

6-2-2. Torque Check (See Fig. 6-2-2.)

1) Set the unit to operating condition without a cassette inserted as instructed in 6-1.
2) Measure the SUPPLY REEL TABLE torque in the REW mode, and confirm that it is 750gcm or more. Perform this measurement keeping the torque gauge in a fixed position with your hand (locked torque).
3) Measure the TAKE-UP REEL TABLE torque in the F.FWD mode, and confirm that it is 600gcm or more (locked torque).
4) Measure the TAKE-UP REEL TABLE torque in the playback mode (SP tape speed), and confirm that it is within 100 through 160gcm (locked torque).
5) Measure the SUPPLY REEL TABLE torque in the REV (F-SEARCH) mode, and confirm that it is within 150 through 240 gcm (locked torque).
6) After confirming that torque readings are within the specifications for each mode, check the following :
   ⓐ Dirt on the capstan motor and the REEL PULLEY groove.
   ⓑ Deterioration of the REEL DRIVE BELT.
   ⓒ Deterioration of the FRICTION GEAR ASS'Y felt (torque during playback).
   ⓓ Wear and damage of the COMPL CLUTCH MECHANISM and the reel drive system gears.

Note1 : Items ⓑ, ⓒ and ⓓ require replacement if found defective.

Note2 : The measured value of torque during FF and REW represents the value 2 seconds after starting.

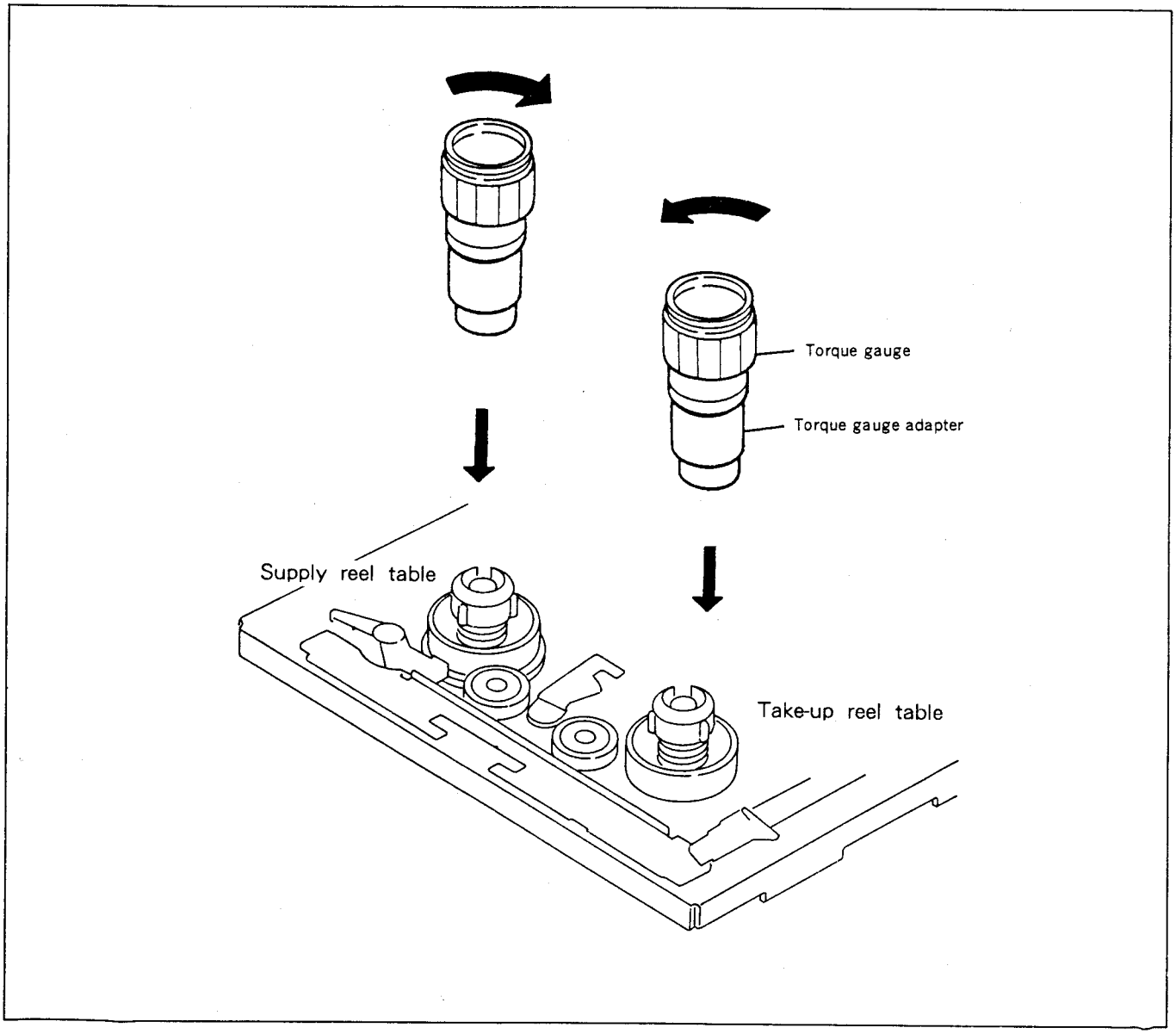


Fig. 6-2-2 Checking REW/FF/PLAY Torque

6-3. TENSION POLE (BACK TENSION GUIDE) POSITION ADJUSTMENT AND BACK TENSION TORQUE CHECK

6-3-1. Tension Pole (Back Tension Guide) Position Adjustment (See Fig. 6-3-1.)

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.
2) Set the PLAY mode with the mode selector (VHJ-0050)
3) Confirm that the space between the end of chassis and the Tension arm is from 4mm to 6mm.
4) In case the tension pole is not withim 4-6mm, adjust it by loosening the screw ④ a little and changing the mounting position of the BAND HOLDER ⑤ in the direction of the arrow Ⓐ.
5) Set the EJECT mode with the mode selector.
6) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1 of Service Manual.
7) Confirm that back tension torque is within 42± 5gcm, as instructed in 6-3-2 below.

6-3-2. Back Tension Torgue Chack (See Fig. 6-3-1.)

1) Attach the cassette torquemeter (VHJ-0016) and set the PLAY mode.
2) Confirm that back tension torque is within 42± 5gcm.
3) In case back tension torque dose not meet the above specification, proceed as follows:

ⓐ Clean the portion where the brake band (BAND HOLDER ASS'Y) ⑦ of the SUPPLY REEL ASS'Y ⑥ makes contact.

ⓑ Confirm that the brake band of the BAND HOLDER ASS'Y ⑦ does not make wear and that it is clean. If wear or dirt is found, replace the band holder assembly ⑦ as instructed in 5-7-3 of Service Manual.

ⓒ Raplace the TENSION LEVER ASS'Y SPRING COIL ⑧.

Note : Always follow procedures in 6-3-1. Tension Pole Position Adjustment after performing ⓐ, ⓑ and ⓒ.

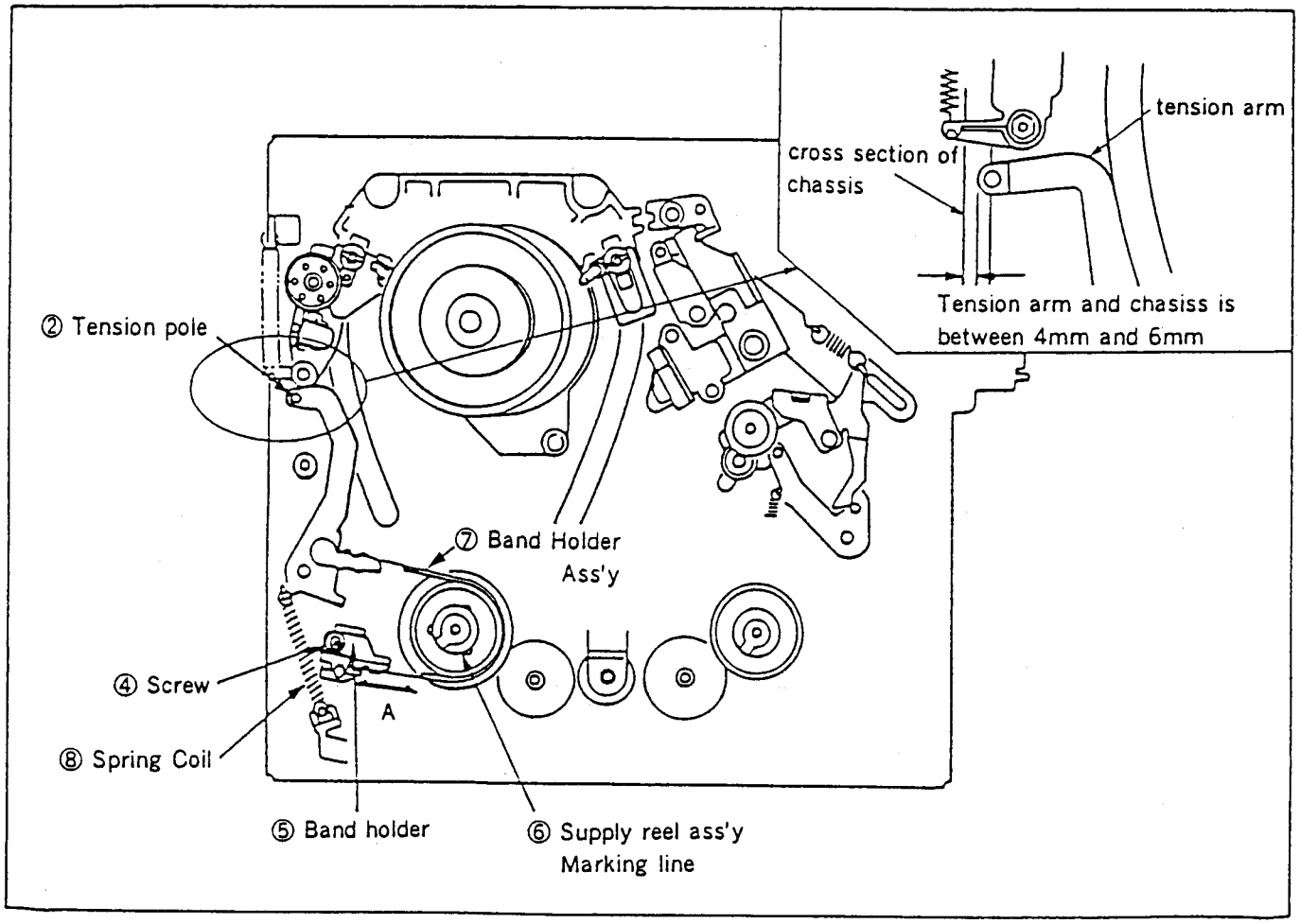


Fig. 6-3-1. Tension Pole Positioning Adjustment

6-4. TAPE PATH ADJUSTMENT

The tape path mechanism is precisely adjusted at the factory. Normally no readjustment is required, but checking and/or adjustment is necessary when parts of the tape path mechanism among those shown in the figure below (See Fig. 6-4-1.) have been removed or replaced after a long period of use.
This operation consists of adjusting the various guides so that the tape drawn out from the supply reel runs smoothly along the DRUM (CYLINDER) lead surface. A way of grasping the tape path condition by electronic means is monitoring the video head output envelope waveform with an oscilloscope. However, the fact that visual observation is essential in order to know whether the tape is running through the various guides in a smooth and natural way should be kept in mind when checking and adjusting.
Also remember that the position of tape guides is not greatly affected by the replacement of the UPPER DRUM (UPPER CYLINDER) or the COMPL DRUM (COMPL CYLINDER), provided that it is correctly performed, and that only the replaced parts should be adjusted after replacing a tape guide or COMPL HEAD BRACKET, since the position of the other tape guides shall not change considerably.

6-4-1. Preparations for Adjustment

(1) Clean the tape transport surfaces (See Fig. 6-4-1.).
(2) Connect the oscilloscope. Connect the channel 1 probe to the envelope waveform test point, and the channel 2 probe to the SW30 (RF SW P) test point. During adjustment, apply a trigger to the low side of the SW30 (RF SW P) in order to monitor the waveform output from channel 1 of the video head.

Note : Since oscilloscope connection points differ according to the model, refer to the "Test Point for Tape Path Adjustment" allocation figure in the electric circuit adjustment section of the service manual book.

(3) Use a dentist's mirror for visual observation of tape path condition.
(4) Use a nut box (VHJ-0048) for adjustment of the fixed guides.
(5) Use an eccentric driver (VHJ - 0003) for adjustment of the guide rollers.
(6) When adjusting height of the fixed guide, guide rollers or COMPL head bracket, turn the special nut or the upper flange clockwise to push the tape downward, and counterclockwise to make the tape rise up.
(7) Do not use the damaged cassette tapes for tape path adjustment.

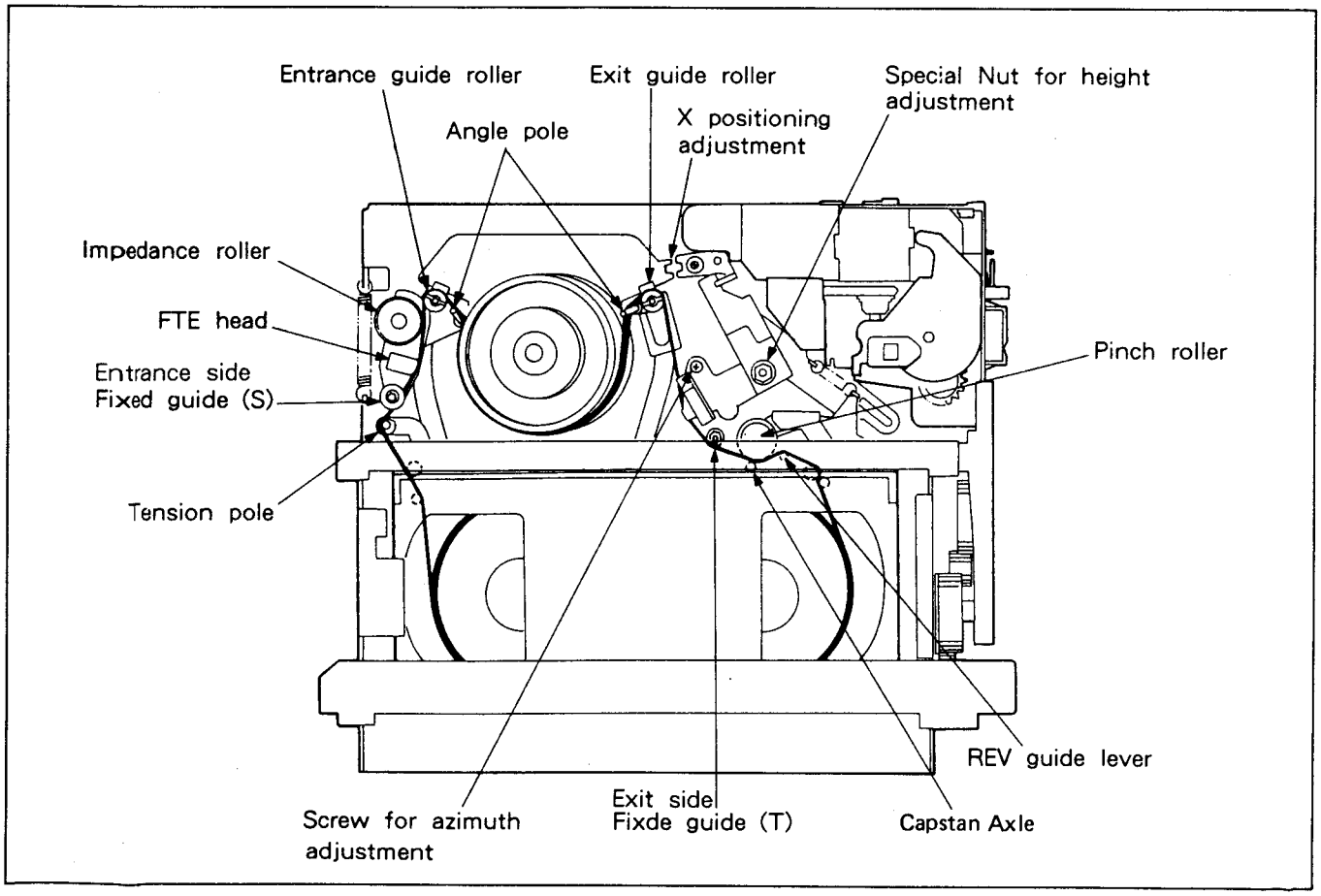


Fig. 6-4-1. Preparation for Adjustment

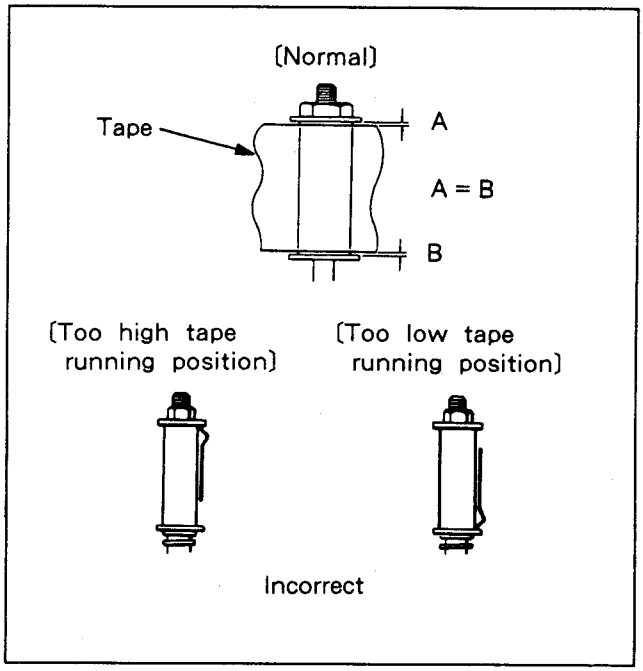
6-4-2. Adjustment by Visual Observation after Guide Roller, Fixed Guide or COMPL Head Bracket Replacement

Perform this adjustment after removing or replacing any of the above parts. Only for the replaced or removed parts, play back an alignment tape (VHJ-0009) beforehand and adjust height by visual observation.

(1) Exit Side Fixed Guide (See Fig. 6-4-2.)
Adjust so that the tape upper edge does not make contact with the fixed guide upper flange, and the tape lower edge does not make contact with the fixed guide lower flange. Gaps A and B should remain equal.

(2) Guide Rollers (See Fig. 6-4-3.)
The tape should not be curled by the guide roller upper and lower flanges. It should also run smoothly, without moving up and down on the DRUM (CYLINDER) lead surface.

Note : An excessive guide roller pressure may cause tape damage.



6-4-2. (1) Pre-set For Exit Side Fixed Guide

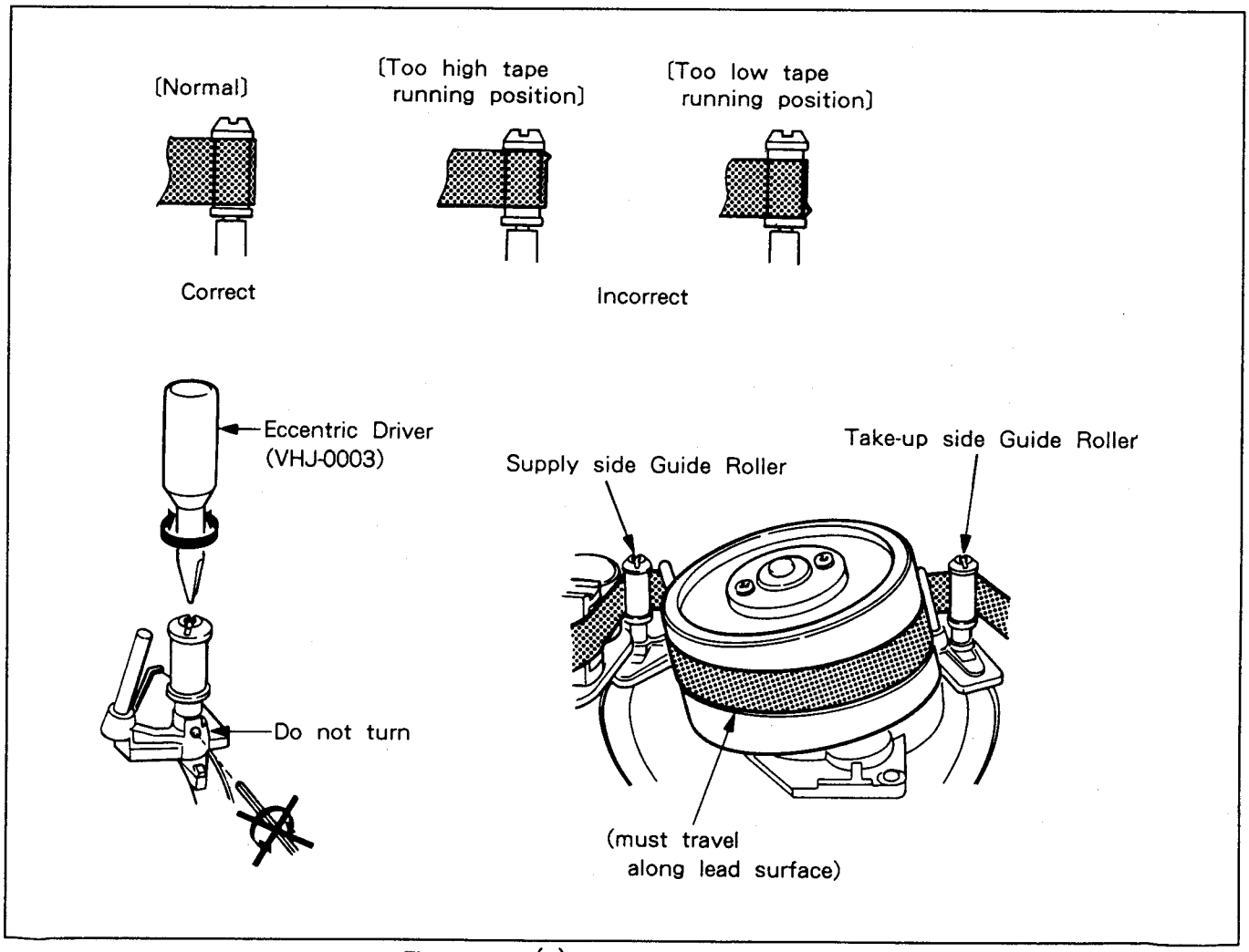


Fig. 6-4-3. (2) Pre-set for Guide Roller

(3) COMPL Head Bracket (ACE Head) (See Fig. 6-4-4.)
Adjust the special nut so that the tape edge runs between the audio head upper end and the control head lower end. Gaps A and B should be of about the same width. Since at this point it is only required that the control signal is picked up and the servo circuit works normally, no adjusting screws except the COMPL head bracket special nut should be touched.

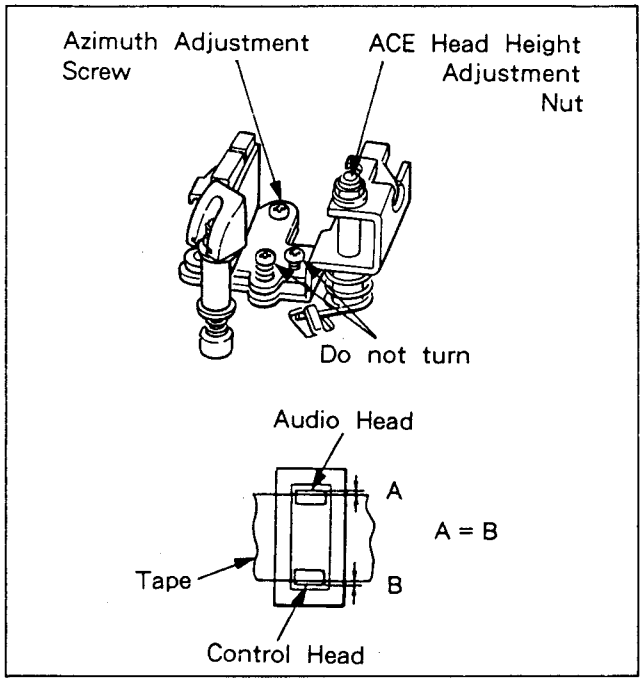


Fig. 6-4-4. (3) Pre-set for Compl Head Bracket

6-4-3. Entrance Side Fixed Guide (S) Height Adjustment (See Fig. 6-4-5.)

The P90 mechanism entrance side fixed guide comes in two types ; the one in this unit is equipped with an upper flange and a spring coil, and it requires height adjustment. The other type is not provided with an upper flange and a spring coil. Height is naturally set when the special nut is fastened, so adjustment is not required.

For units with an upper flange, perform height adjustment as explained below. Even for types which do not require height adjustment, check whether the lower tape edge runs along the lower flange. Be careful not to fasten the special nut excessively, causing the axle to run idle.

1) Rotate the fixed guide (S) counterclockwise to lift the tape somewhat, then insert the fixed guide height gage (VHJ-0053) into the lower side of the fixed guide (S) lower flange.
2) Rotate the fixed guide (S) special nut clockwise a little at a time until the lower flange makes contact with the upper surface of the fixed guide height gage, causing a slight drag.
3) After rotating the special nut 90° counterclockwise, remove the Axed guide height gauge.
4) After adjusting the guide rollers in section 5-4-4, play back the alignment tape (VHJ-0009). Confirm that the tape lower edge runs in close contact with the fixed guide (S) lower flange. In case too much pressure has left a gap between the tape and the lower flange, or excessive lifting has caused curling of the tape lower edge, perform fine adjustment. However, do not adjust the special nut beyond 90° clockwise and 45° counterclockwise.

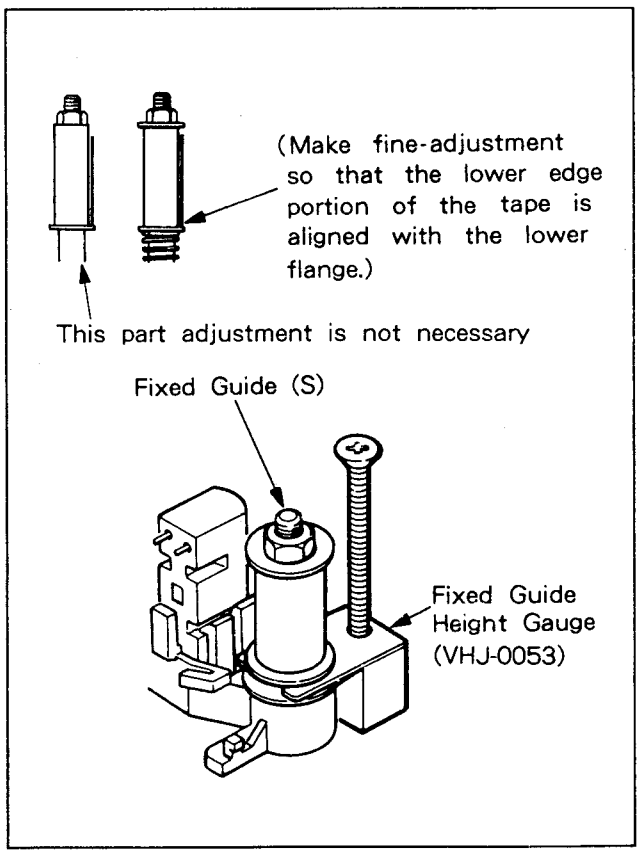

(Make fine-adjustment so that the lower edge portion of the tape is aligned with the lower flange.)
This part adjustment is not necessary
Fixed Guide (S)
Fixed Guide Height Gauge (VHJ-0053)

Fig. 6-4-5. Entrance Side Fixed Guides

6-4-4. Guide Roller Adjustment (See Fig. 6-4-6.)

1) Play back the alignment tape (VHJ-0009), press the tracking control key and adjust the envelope waveform to the maximum level.
2) Loosen the entrance and exit guide rollers by rotating them counterclockwise, then rotate them clockwise alternately until they are fastened and a flat video output waveform is obtained.
3) Confirm that the envelope waveform is not deformed, and check visually that no curling occurs at the guide roller upper and lower flanges.
4) Press the tracking control key and set the envelope waveform level to approx. 50% of the maximum. In this condition, confirm whether the envelope waveform is flat. It will not, showing valleys or peaks at the first half (entrance) or second half (exit), if the guide roller pressure is excessive or insufficient.
   In case there is unevenness in the first half (entrance), adjust the entrance side guide roller. If the second half (exit) shows trouble, adjust finely the exit side guide roller.

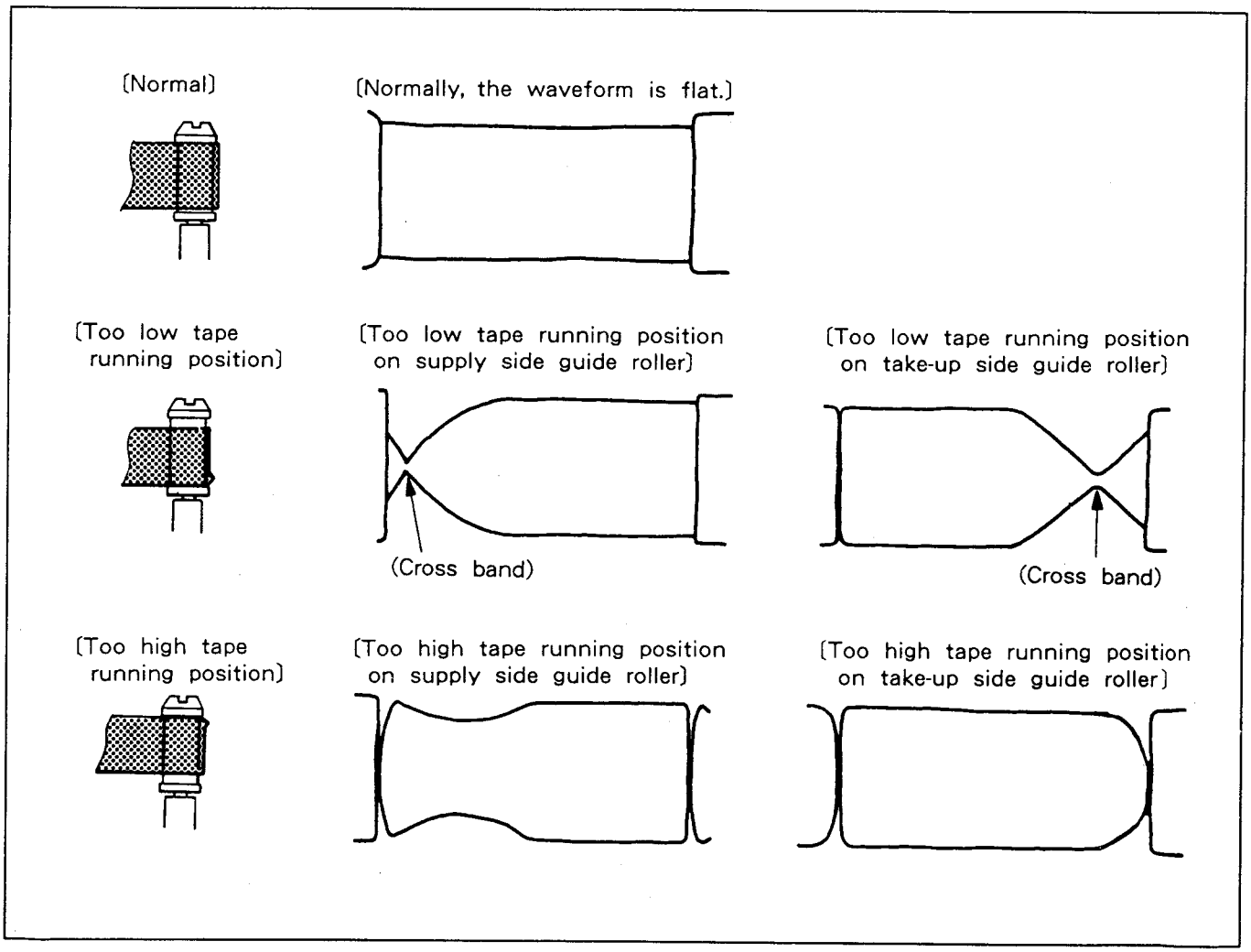

(Normal)
(Normally, the waveform is flat.)
(Too low tape running position)
(Too low tape running position on supply side guide roller)
(Too low tape running position on take-up side guide roller)
(Cross band)
(Cross band)
(Too high tape running position)
(Too high tape running position on supply side guide roller)
(Too high tape running position on take-up side guide roller)

Fig. 6-4-6. Guide Roller Adjustment

6-4-5. Exit Side Fixed Guide (T) Adjustment (See Fig. 6-4-7.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Rotate the special nut counterclockwise so that the lower flange lifts the tape until its lower edge is slightly curled.
3) Rotate the special nut clockwise a little at a time until curling of the tape lower edge is removed.
4) Confirm at each mode (PLAY, F.SEARCH, R. SEARCH, F.F and REW) that the tape runs along the lower flange and that no curling occurs.

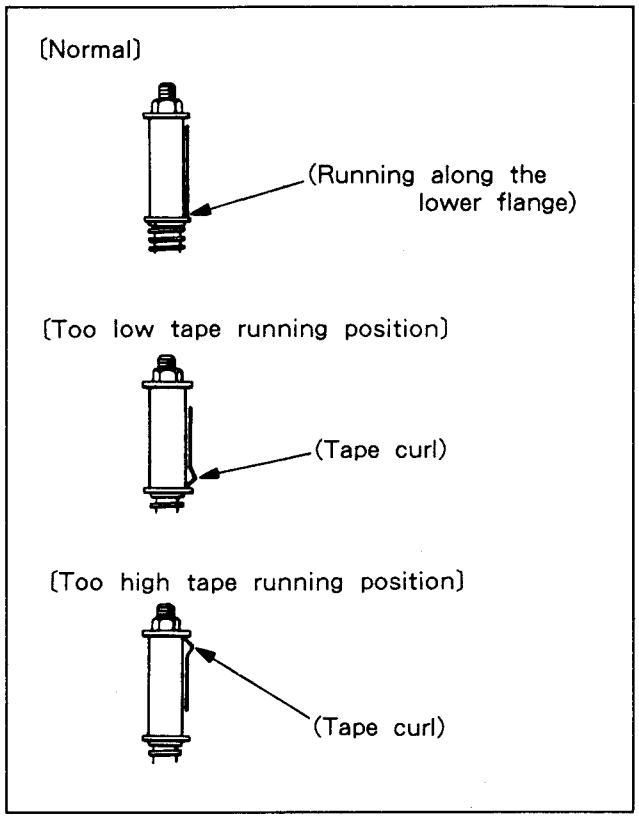


Fig. 6-4-7. Fixed Guide (T)

6-4-6. COMPL Head Bracket (ACE Head) Adjustment

(1) Height Adjustment and Azimuth Adjustment (See Fig. 6-4-8.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Monitor the audio output waveform with the oscilloscope.
3) Rotate the azimuth adjustment screw until the audio output waveform amplitude is maximum.
4) After loosening the ACE head height adjustment special nut, rotate it slowly clockwise until amplitude of the audio output waveform is maximum, then adjust it finely clockwise to the point just before the said waveform amplitude begins to decrease.
5) Rotate the azimuth adjustment screw until amplitude of the audio output waveform is maximum.
6) Confirm that the audio output waveform amplitude does not fluctuate.

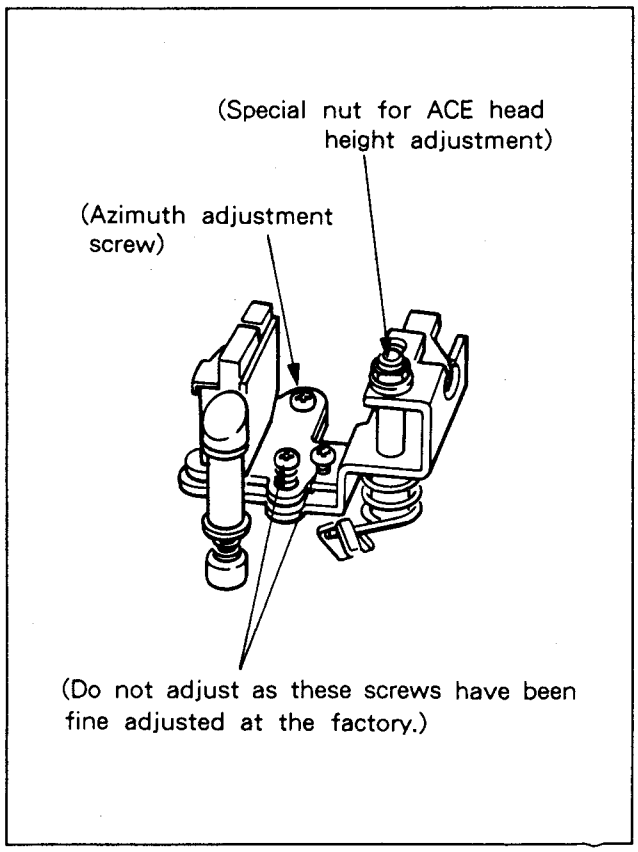

(Special nut for ACE head height adjustment)
(Azimuth adjustment screw)
(Do not adjust as these screws have been fine adjusted at the factory.)

Fig. 6-4-8. Compl Head Bracket

(2) Tracking (X Value) Adjustment (See Fig. 6-4-9.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Set tracking to the center position with the tracking control key (See Note below).
3) Rotate the stopper bracket fixing screw 180° counterclockwise.
4) Monitor the video head output envelope waveform with the oscilloscope.
5) Adjust the stopper bracket position so that amplitude of the envelope waveform becomes maximum at the tracking center and the envelope waveform amplitude changes by the same amount when shifting the tracking center by pressing the plus (+) and minus (−) tracking control keys.
6) Tighten the fixing screw.
7) (Model for LP mode tape speed capability)
Playback the alignment tape (VHJ-0052) and set the tracking to the center using a tracking control key.
Then confirm that the playback picture on screen is normal. If not, Make readjustment by referring to items 1) through 7). To readjust, playback VHJ-0009 and finely adjust the position of the stopper bracket within the range in which the amplitude of the envelope waveform can be held to a maximum.
8) Perform servo circuit PB PHASE (Switching position) adjustment.

Note : For models equipped with auto tracking, always set to the manual tracking mode before adjustment. To confirm the tracking center position, press the tracking keys (+, −) and observe the front panel clock display. It will read "T − : −" at the tracking center, "T − : , T − − : " when keeping the minus (−) key pressed, and "T : −, T : − −" when keeping the plus (+) key pressed. The time indication will be restored 2 to 3 seconds after the tracking keys are released.

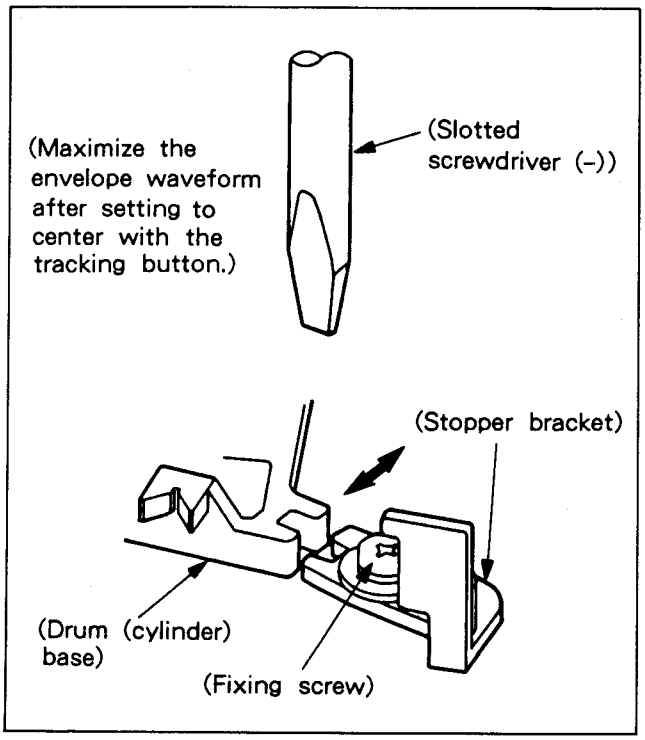

(Maximize the envelope waveform after setting to center with the tracking button.)
(Slotted screwdriver (−))
(Stopper bracket)
(Drum (cylinder) base)
(Fixing screw)

Fig. 6-4-9

6-4-7. Checking after Adjustment

Tape running may show a slight change depending upon the type of the cassette tape (thick or thin tape), the start, middle, or end of cassette tape winding, etc. After performing the tape path adjustment with use of an alignment tape, be sure to check the following points. Incidentally, the alignment tape to be used should be E-180 or E-240 cassette should be a good one without any damage to it.

(1) Try to play back the alignment tape (VHJ-0009) and confirm that the envelope waveform rise immediately and that there is no fluctuation in the envelope waveform and the audio output waveform.

(2) Load a cassette tape E-180 and start recording operation in the standard mode. 1 kHz should be fed to the audio input terminal when recording. After recording, the following points should be checked.

1. When the recorded portion is played back, the envelope waveform rise immediately, and no fluctuation in the envelope waveform is observed. Also, no speed drop occurs during the first half period or the last half period. Further, check to be sure that no fluctuation occurs in the audio waveform. Also confirm that neither the tape curling or derailing is caused on the upper or lower flange and the on the read side of the drum.
2. Confirm that no tape curling or derailing occurs in the upper or lower flange of each tape guide and the read side of the drum during each mode of operation, namely, FF, REW, F. SEARCH, and R. SEARCH.
3. Confirm that the envelope waveform rise immediately after changing the mode directly to the PLAY from each mode of FF, REW, F. SEARCH, R. SEARCH, or POWER OFF (INITIAL) and that no tape curling or derailing occurs in the upper or lower flange of the each tape guide and on the read side of the drum.

(3) Load a E-240 cassette tape and perform recording operation in the SP mode. 1 kHz should be fed to the audio input terminal when recording. Now, confirm that the envelope waveform rise immediately upon starting the playback of the recorded portion, and that neither fluctuation in the envelope waveform nor a speed drop occurs during the first half period or the last half period. Also confirm that no tape curling or derailing is caused in the upper or lower flange of each tape guide and on the drum lead surface.

(4) Perform recording for 60 seconds in the SP mode at the start of E-240 cassette winding. Play back the recorded portion and repeat the F.SEARCH ↔ R.SEARCH ten times, following which confirm that no damage is done to the tape edge. If any damage is found on the tape edge, a proper step must be taken as below depending upon the symptom obserbed.

1. When a sawtooth shaped damage is caused on underside of the tape edge by the REV guide
   1) Check to see if damage is done to the tape by the REV guide.
   2) Loosen the tilt adjustment screw of the ACE head bracket by turning it 135° counterclockwise.
   3) Make readjustment of the exit side fixing guide by referring to item 6-4-5.
   4) Make readjustment of the ACE head bracket (azimuth, height and adjustment of X value) by referring to item 6-4-6.
   5) Confirm that no fluctuation in the audio level is caused by loosening the tilt adjustment screw in steps 1) and 2) above. Move the screw a little back if any fluctuation is found (but never move it back to the original position). After adjusting the tilt adjustment screw is readjusted, perform steps 3) and 4) once again.
   6) Confirm again that the E-240 cassette tape does not sustain any damage.
   7) Perform the recording and playback on the E-180 and E-240 cassette tape and confirm that no fluctuation occurs in the envelope waveform and the audio waveform.

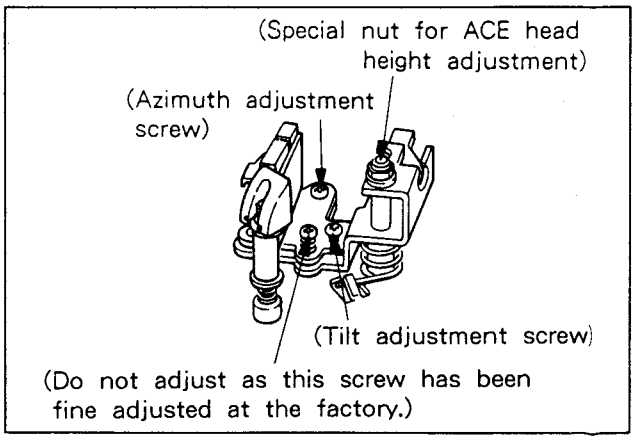

(Special nut for ACE head height adjustment)
(Azimuth adjustment screw)
(Tilt adjustment screw)
(Do not adjust as this screw has been fine adjusted at the factory.)

Fig. 6-4-10 Compl Head Bracket

2. If damage in the form of a sawtooth or a streak is found on the tape edge
   1) Check if a large amount of magnetic particles is adhered to the exit-side guide roller. If magnetic particles cannot be removed in spite of repeated cleaning, the guide roller must be replaced.
   2) Confirm if the tape is held too tightly by the exit-side guide roller, or if the last half of the envelope waveform is flat. If the type is found held too tightly, readjustment should be made by referring to 6-4-4.
   3) Recheck if the damage is still caused on the E-240 tape.
      If similar damage is still found on the tape, the exit-side guide roller should be loosened about 20° counterclockwise.
   4) Check once again that no fluctuation is caused in the envelope waveform or the audio waveform by loosening the exit-side guide roller. To do this, record and play back the E-240 cassette tape.

(5) Perform recording for 60 seconds in the SP mode at the near end of the E-240 cassette tape. Play back the recorded portion and repeat the F. SEARCH ↔ R. SEARCH ten times, following which a check should be made to see if damage is still done to the tape edge. If a damage in the form of a sawtooth or a streak is still occurred on the tape edge by the upper lounge of entrance side guide roller, proceed with the step given below.
   1) Check if a large amount of magnetic particles is adhered to the entrance-side guide roller. If the magnetic particles cannot be removed in spite of repeated cleaning, the guide roller must be replaced with new one.
   2) Confirm if the tape is held too tightly by the entrance-side guide roller, or if the first half of the envelope waveform is flat. If the tape is found held too tightly, readjustment should be made by referring to 6-4-4.
   3) Recheck if the damage is still caused on the E-240 tape.
      If the damage is still found on the tape, the entrance-sideguide roller should be loosened aboud 20° counterclockwise.
   4) Check once again that no fluctuation is caused in the envelop waveform or the audio waveform by looseving the entrance-side guide roller. To do this, record and play back the E-240 cassette tape.

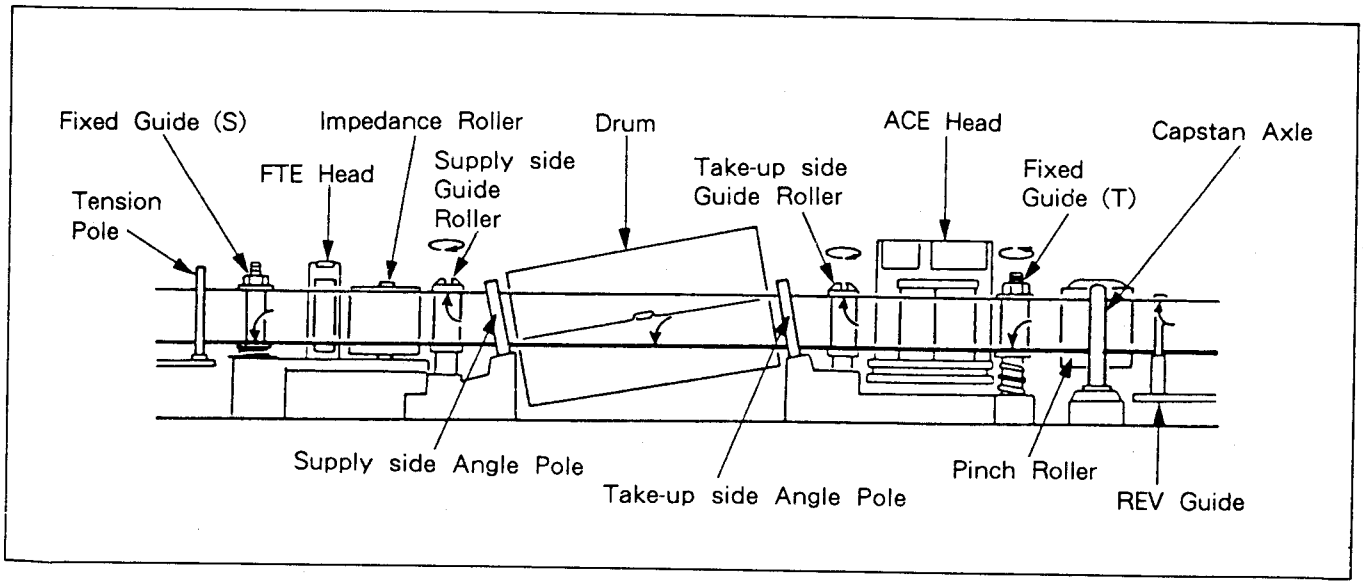


Fig. 6-4-11.

SECTION 6
ELECTRICAL ADJUSTMENTS

1. CIRCUIT BOARD LOCATIONS

1-1. MAIN BOARDS

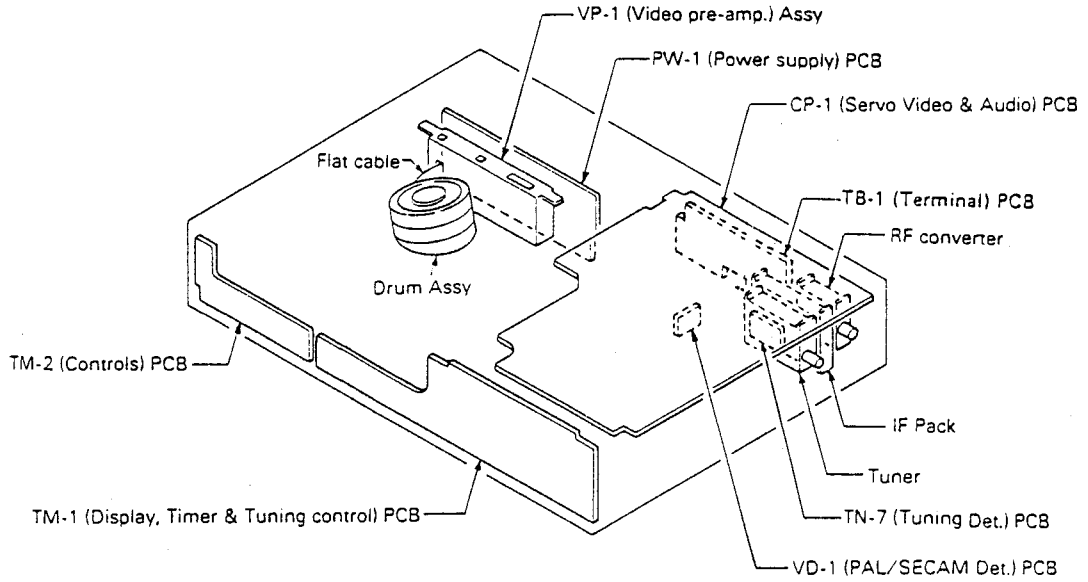


Fig. 1-1

1-2. LOCATION FOR TAPE PATH ADJUSTMENT

NOTE: Test point TP182 and TP183 for tape path adjustment is shown in figure below.
For adjustment, refer to item "6-4.TAPE PATH ADJUSTMENT" (on page 134).

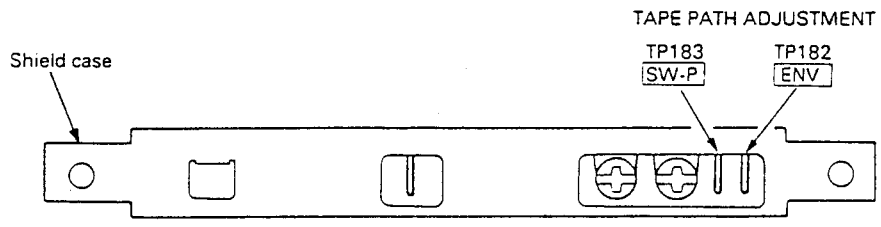


Fig. 1-2 Pre-amp Unit

2. ELECTRICAL ADJUSTMENT

2-1. PREPARATION

2-1-1. EQUIPMENT

- Colour TV monitor
- PAL Colour-bar generator (with RF and LINE OUTPUT)
- Audio signal generator
- Oscilloscope (dual trace; frequency response: 10MHz or more; probe: 10:1)
- Frequency counter (countable to 10MHz or higher)
- Digital voltmeter
- AC voltmeter
- In/output probes
- Relay jig (VHJ-0065) 5-wire cable for Pre-amp unit
  Connect the Flat cable end from the Drum assembly to the Pre-amp unit using the Relay jig to provide simple repairing and adjustment of the Pre-amp unit, as shown in Fig. 2-1-1. Further, when andjusting the Pre-amp unit, be sure to make contact an end of Shield case with Bracket of the Pre-amp unit to maintain the shield effect.
- Extension relay jig (VHJ-0079) for CP-1 PCB
  Connect between the CP-1 and TM-1 PCB using the Extension relay jig to provide simple repairing and adjustment of the CP-1 PCB, as shown in Fig. 2-1-2. Correctly, connect the Connector from CN304 on the CP-1 PCB to CN006 of the Relay jig, and that from CN002 of the Relay jig to CN711 of the TM-1 PCB. The connector from CN001 of the Relay jig is not required connect.

[Alignment Tape (MH-2)] (H-7099-052-H)
In making the adjustment, an alignment tape for VHS (PAL). If a model is specified, be sure to use a tape of the model. If not either model of a tape can be used.

	Time	Video signal	Audio signal
1	10 minutes	Stair-step	6 kHz
2	5 minutes	———	3 kHz
3	10 minutes	Color bar	1 kHz
4	3 minutes	RF sweep	———

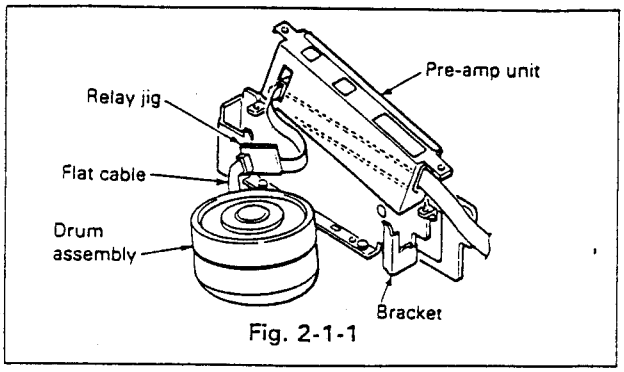


Fig. 2-1-1

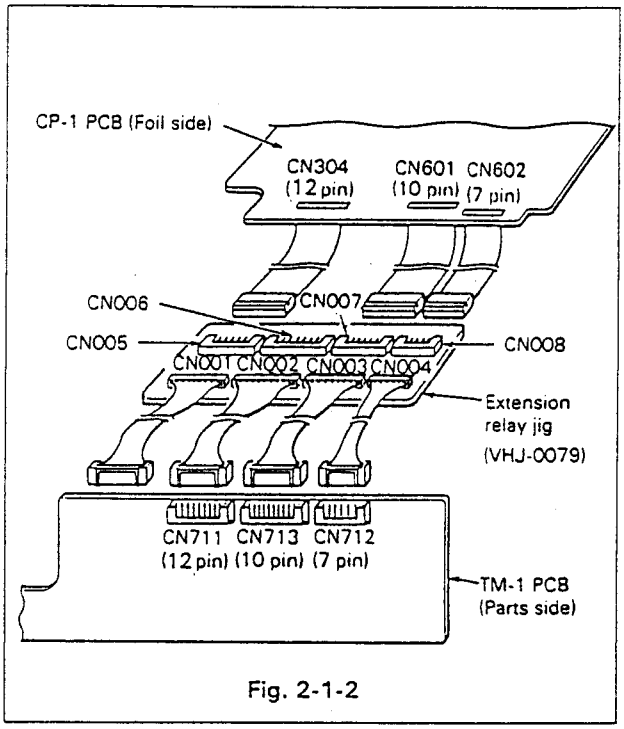


Fig. 2-1-2

2-1-2. SET-UP

Because the RF input signal is used for circuit adjustments, connect the colour-bar generator to the ANT IN terminal of the VCR. The RF input signal is processed by the tuner and IF circuit. It is important that the video output signal of the IF circuit satisfies the items shown in Fig. 2-1-3. Connect the oscilloscope to the VIDEO OUTPUT terminal of the video circuit and terminal with a 75Ω load, and then check the video output signal.

- The amplitude of the sync signal should be approximately 0.3 Vp-p.
- The amplitude of the video signal should be approximately 0.7 Vp-p.
- While observing the oscilloscope or TV screen, make fine-tuning adjustments so that the colour burst amplitude is approximately 0.3 Vp-p.
- Check to be sure that there is no spike noise in the sync part of the horizontal sync signal.

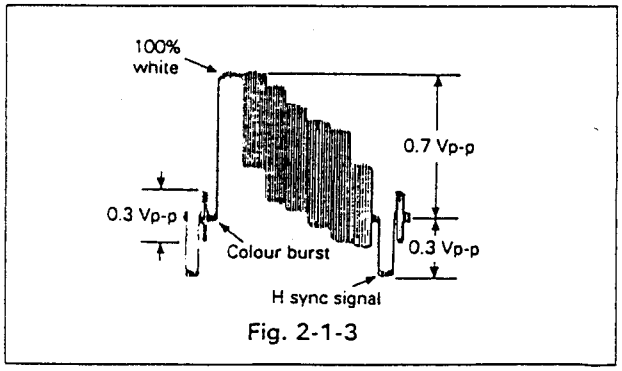
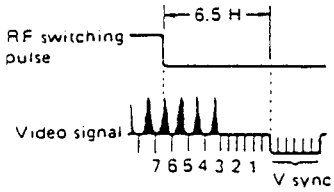


Fig. 2-1-3

2-2. SERVO CIRCUIT ADJUSTMENT ..... CP-1 PCB

NOTE (1) : These adjustments should be carried out upon completion of the transport adjustments.
(2) : If the tape transport adjustments are carried out after these adjustments, follow the procedures again in SWITCHING POSITIONS.

No.	Item	Input	Mode	Point	Location	Remark
1	SWITCHING POSITION	Alignment cassette (MH-2)	PLAY	VIDEO OUTPUT TP101 RF SW pulse TP351	VR351	 1. Press the tracking control (+) (–) buttons simultaneously to the center position (on the display "T —:— "). 2. Adjust VR351 so that the phase of the leading edge of the vertical sync signal is delayed 6.5 ± 0.5 H from the fall of the RF switching pulse waveform.
2	STILL V-LOCK	Colour bar from Colour bar generator	REC ↓ PLAY ↓ STILL	TV screen	VR361 Rear panel	1. Put the VCR in the REC mode and record at the middle of the cassette tape. 2. Playback the recorded part, and put the VCR in the STILL mode. 3. Adjust VR361 so that the V jitter (very fine movement of the vertical sync) is minimized.

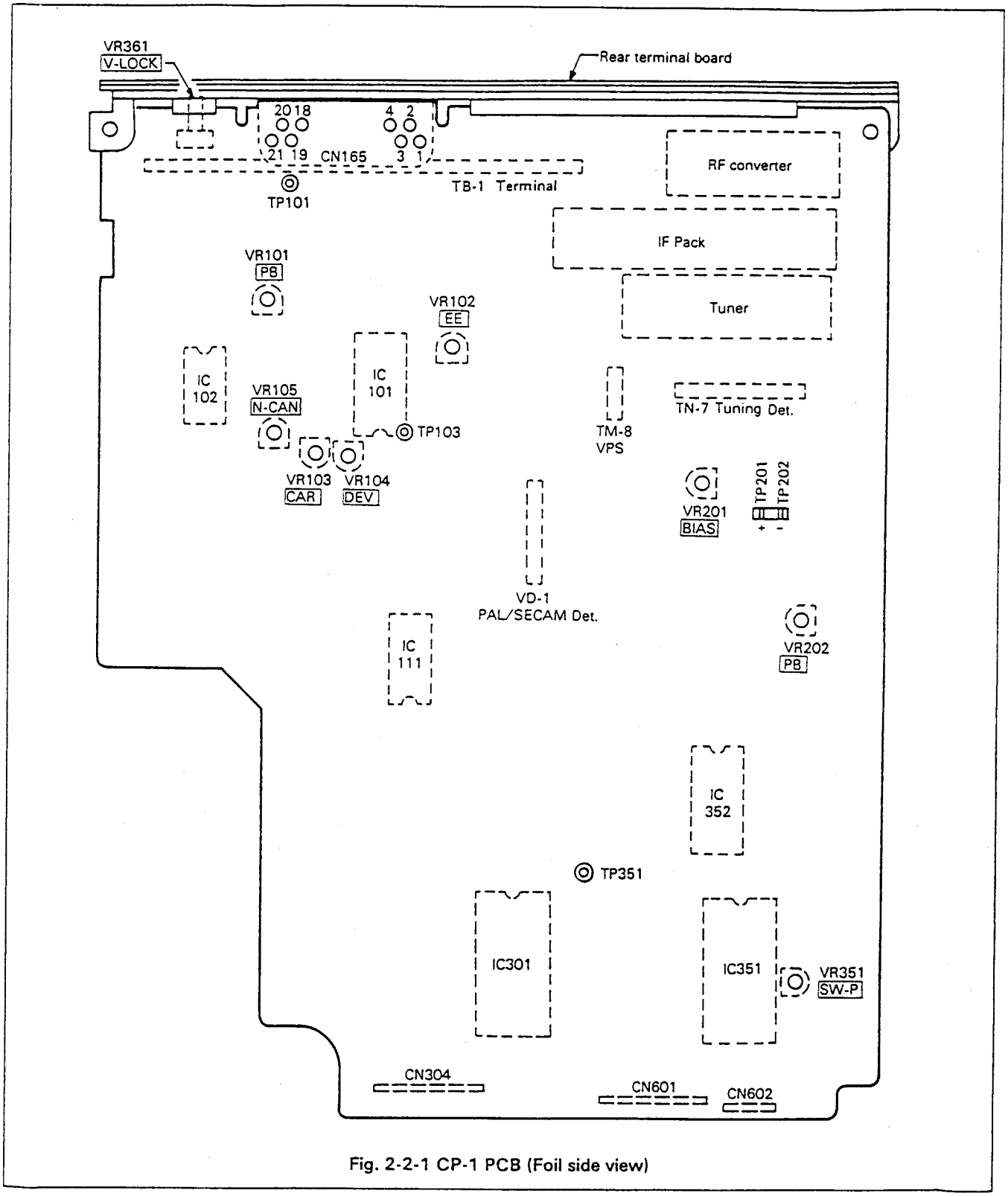
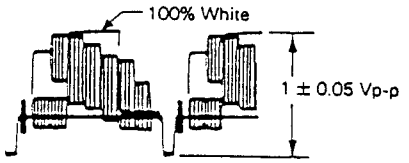
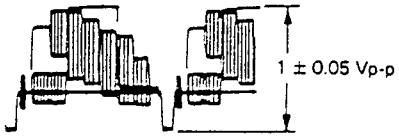
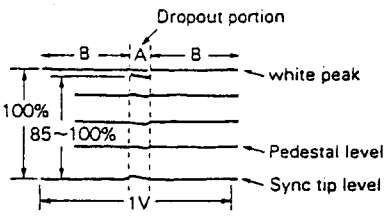
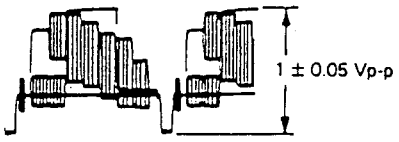
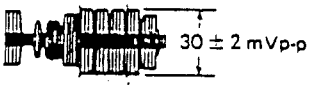
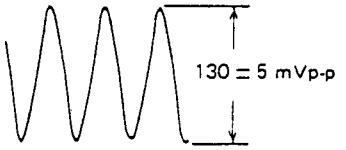


Fig. 2-2-1 CP-1 PCB (Foil side view)

2-3. VIDEO CIRCUIT ADJUSTMENT ... CP-1 PCB and VP-1 Assy

NOTE (1) : When adjustment No. 1, No. 2 and No. 5 below, terminate VIDEO OUTPUT TP101 at 75 ohms.
(2) : Adjustment No. 3 below, should be performed after stabilizing the circuit operation. (At least 5 minutes after VCR power on.)
(3) : 'No-signal REC mode' is not to supply any signal to VIDEO INPUT terminal.
(4) : Use the Relay jig mentiond in the 2-1. PREPARATION to provide easy adjustment of the Pre-amp unit.

No.	Item	Input	Mode	Point	Location	Remark
1	E-E LEVEL	Colour bar (100% white level) from Colour bar generator	E-E	VIDEO OUTPUT TP101 (CP-1 PCB)	VR102	 1. Adjust VR102 so that the level is 1.00 ± 0.05 Vp-p.
2	PB-Y LEVEL	Alignment cassette (MH-2)	PLAY	VIDEO OUTPUT TP101 (CP-1 PCB)	VR101	 1. Adjust VR101 so that the level is 1.00 ± 0.05 Vp-p.
3	N-CAN LEVEL	Alignment cassette (MH-2)	PLAY	VIDEO OUTPUT TP101 (CP-1 PCB)	VR105	 1. Set the horizontal scale (TIME/DIV) of the oscilloscope to 1 msec./div.. 2. Adjust VR105 so that the white peak level at drop out portion "A" becomes 85 ~ 100% for the white peak level of no drop out portion "B".
4	CARRIER SET	No-signal	REC	TP103 (CP-1 PCB)	VR103	1. Set the channel selector buttons to the AV position and put the VCR in the no-signal REC mode. 2. Adjust VR103 so that the frequency is 3.80 ± 0.05 MHz.
5	DEVIATION	Colour bar (100% white level) from Colour bar generator	REC (Adjust-ment) ↓ PLAY (Check)	VIDEO OUTPUT TP101 (CP-1 PCB)	VR104	 1. Insert the blank tape to the VCR and record colour bar signal. 2. Playback the recorded part, and check that the level is 1.00 ± 0.05 Vp-p. 3. Repeat adjust VR104 before the record, and the playback it, if not satisfactory.

No.	Item	Input	Mode	Point	Location	Remark
6	C REC CURRENT	Colour bar from Colour bar generator	REC	TP181 (HOT) shield case (GND) (Pre-amp)	VR181	 1. Rotate VR182 so that the luminance level is minimize. 2. Adjust VR181 so that the level is 30 ± 2 mVp-p.
7	Y REC CURRENT	No-signal	REC	TP181 (HOT) shield case (GND) (Pre-amp)	VR182	 1. Set the channel selector buttons to AV position and put the VCR in the no-signal REC mode. 2. Adjust VR182 so that the level is 130 ± 5 mVp-p.

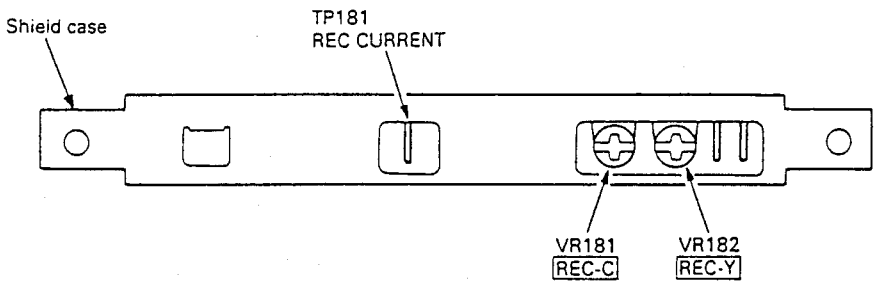


Fig. 2-3-1 Pre-amp Unit

2-4. AUDIO CIRCUIT ADJUSTMENT ... CP-1 PCB

NOTE (1): 'No-signal record mode' is not to supply any signal to AUDIO INPUT terminal.
NOTE (2): Item No. 2 apply to the model that equipped with 21 pin SCART on the rear terminal board.
NOTE (3): Item No. 3 apply to the model that equipped with RCA pin jack on the rear terminal board.

No.	Item	Input	Mode	Point	Location	Remark
1	BIAS LEVEL	No-signal	REC	TP201 TP202 (GND)	VR201	1. Set the channel selector buttons to the AV position and put the VCR in the no-signal REC mode. 2. Adjust VR201 so that the level is 20 mVrms.
2	REC/PB OUTPUT LEVEL	Audio signal (1 KHz, -3.8 dBs) from Audio signal generator	REC ↓ PLAY	AUDIO OUTPUT CN165 pin 1	VR202	1. Adjust VR202 so that the recorded 1 KHz output level becomes -3.8 dBs in the PLAY mode.
3	REC/PB OUTPUT LEVEL	Audio signal (1 KHz, -8 dBs) from Audio signal generator	REC ↓ PLAY	AUDIO OUTPUT terminal	VR202	1. Adjust VR202 so that the recorded 1 KHz output level becomes -8 dBs in the PLAY mode.

2-5. TUNER IF CIRCUIT ADJUSTMENT ... IF Pack

NOTE: When performing the adjustment for the type B model, be sure to remove the rear terminal board fro CP-1 PCB (see Fig. 2-2-1 on page 145).

No.	Item	Input	Mode	Point	Location	Remark
1	RF AGC	TV broadcast	E-E	TV screen	VR611	1. Turn VR611 in the direction which causes snow to appear, then in the opposite direction until the snow just disappears.

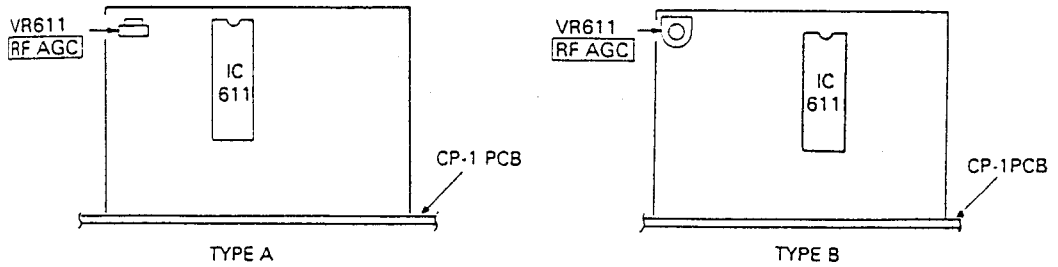


Fig. 2-5-1 IF Pack (Parts side view)

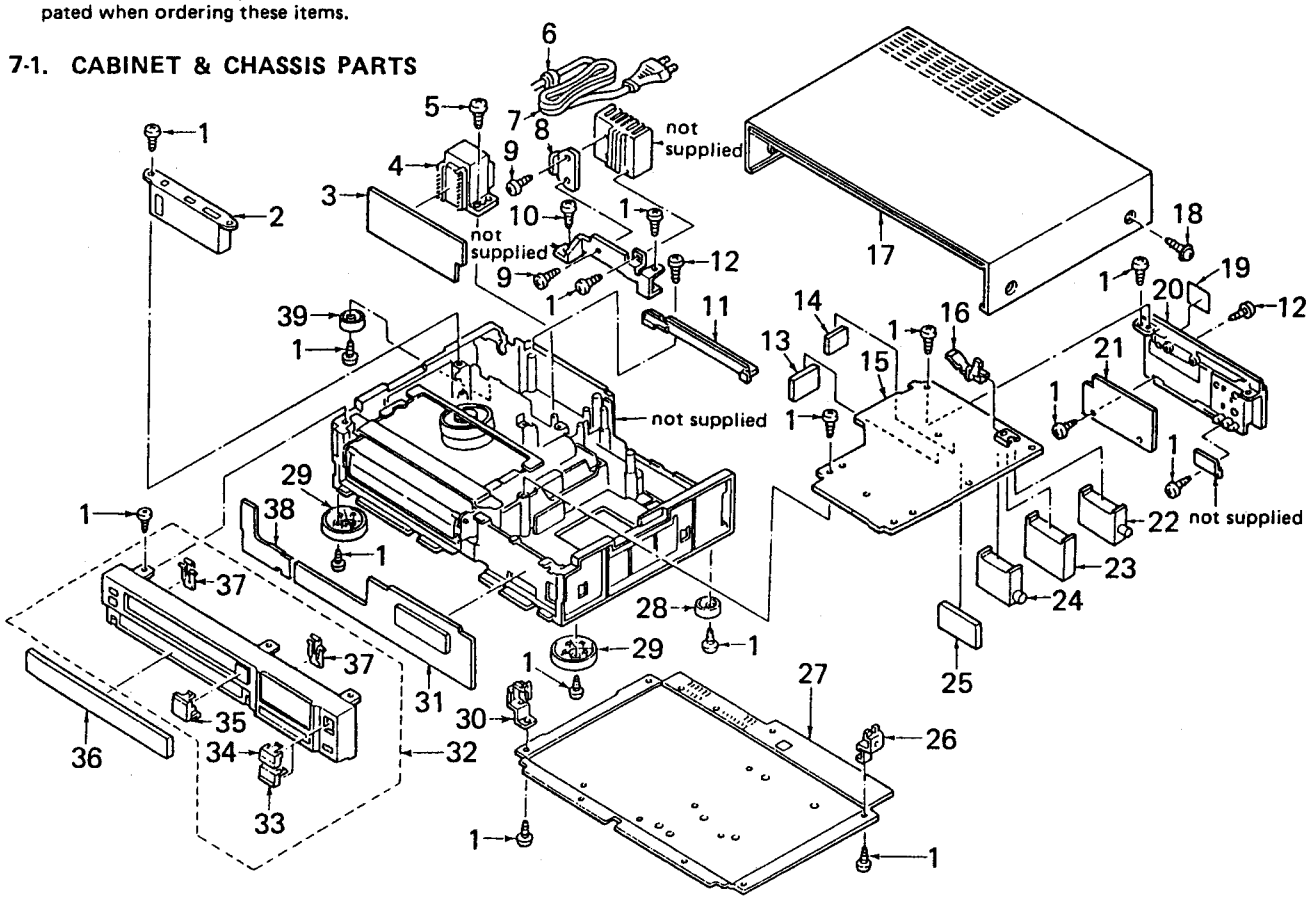
SECTION 7
EXPLODED VIEWS

NOTE:

- The mechanical parts with no reference number in the exploded views are not supplied.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked "★" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part number suffix -XX and -X may be different from the parts specified in the components used on the set.
- Color Indication of Appearance Parts
  Example:
  (RED) . . . KNOB, BALANCE (WHITE)
  ↑ Cabinet's Color ↑ Parts Color

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

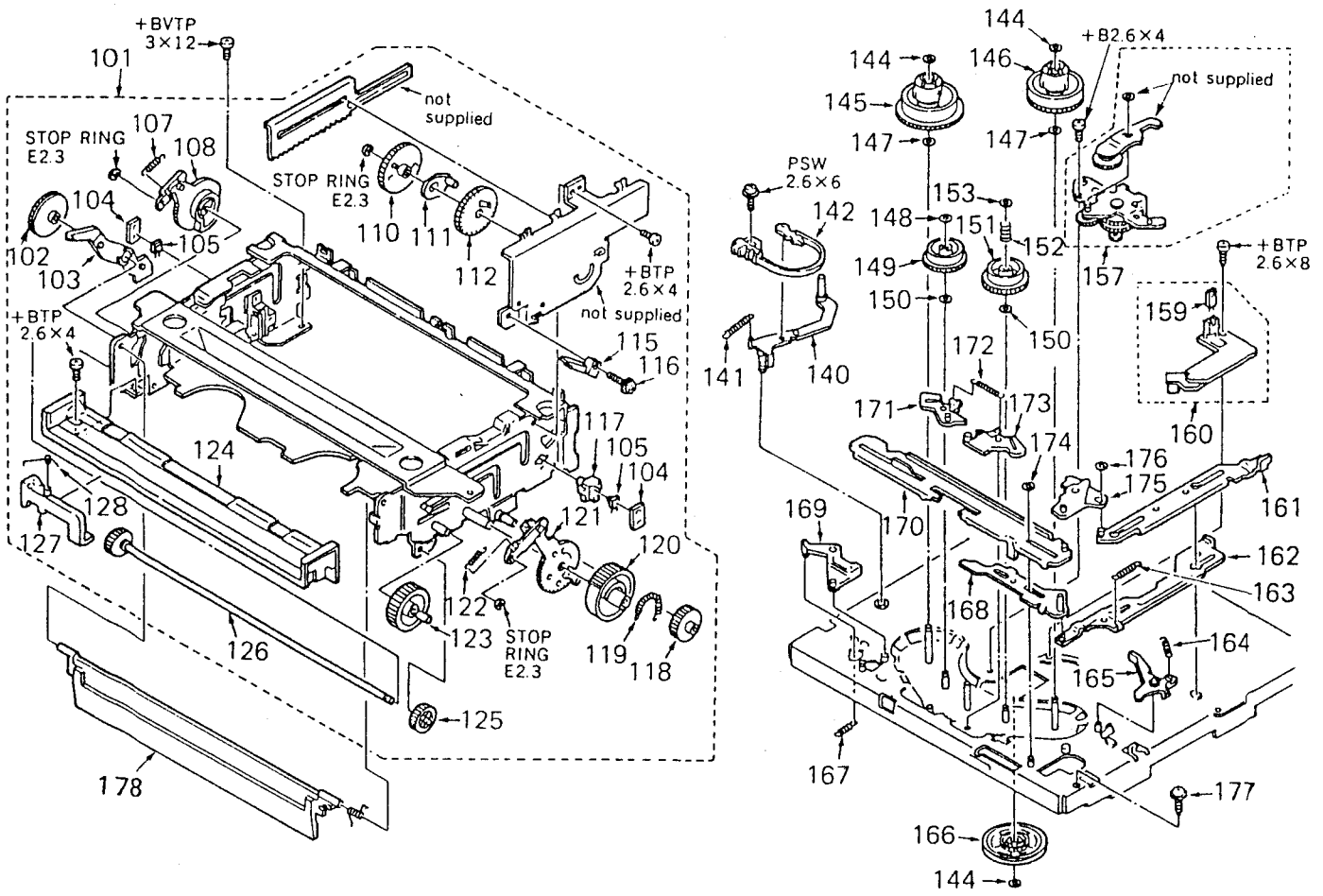
7-1. CABINET & CHASSIS PARTS



No.	Part No.	Description	Remark
1	7-685-647-79	SCREW +BVTP 3X10 TYPE2 N-S	
2	*A-6725-849-A	VP-1 BOARD, COMPLETE	
3	*A-6725-851-A	PW-1 BOARD, COMPLETE	
4	⚠1-450-172-11	TRANSFORMER, POWER (T5001)	
5	7-685-659-21	SCREW +BVTP 4X8	
6	⚠3-741-474-01	FIXER	
7	⚠1-575-325-11	CORD	
8	*A-6725-848-A	PW-2 BOARD, COMPLETE	
9	7-685-650-79	SCREW +BVTP 3X16 TYPE2 SLIT	
10	7-685-645-79	SCREW +BVTP 3X6 TYPE2 SLIT	
11	3-740-337-01	BLIND	
12	7-685-647-79	SCREW +BVTP 3X10 TYPE2 N-S	
13	1-415-765-11	DELAY LINE (DL131)	
14	*A-6725-862-A	VD-1 BOARD, COMPLETE	
15	A-6725-937-A	CP-A BOARD, COMPLETE	
16	3-747-604-01	SPRING PLATE	
17	3-749-247-01	COVER, TOP	
18	3-740-334-01	SCREW, SPECIAL	
19	3-747-610-01	INDICATOR (JACK COVER)	
20	1-535-855-11	TERMINAL	

No.	Part No.	Description	Remark
21	A-6725-935-A	TB-1 BOARD, COMPLETE	
22	1-466-392-11	MODULATOR, RF	
23	1-466-269-11	PACK, IF	
24	1-465-353-11	PACK, TUNER	
25	*A-6725-850-A	TN-7 BOARD, COMPLETE	
26	3-747-614-01	BRACKET	
27	3-740-325-01	COVER, BOTTOM	
28	3-740-333-01	STAND (B)	
29	3-940-673-01	STAND (F)	
30	3-747-613-01	BRACKET	
31	A-6725-939-A	TM-1 BOARD, COMPLETE	
32	A-6704-460-A	CABINET ASSY, FRONT	
33	3-749-815-01	BUTTON (CH) (-)	
34	3-749-814-01	BUTTON (CH) (+)	
35	3-749-817-01	BUTTON (EJECT)	
36	A-6704-492-A	DOOR ASSY	
37	3-740-330-01	LOCK	
38	*A-6725-856-A	TM-2 BOARD, COMPLETE	
39	3-740-332-01	STAND (A)	

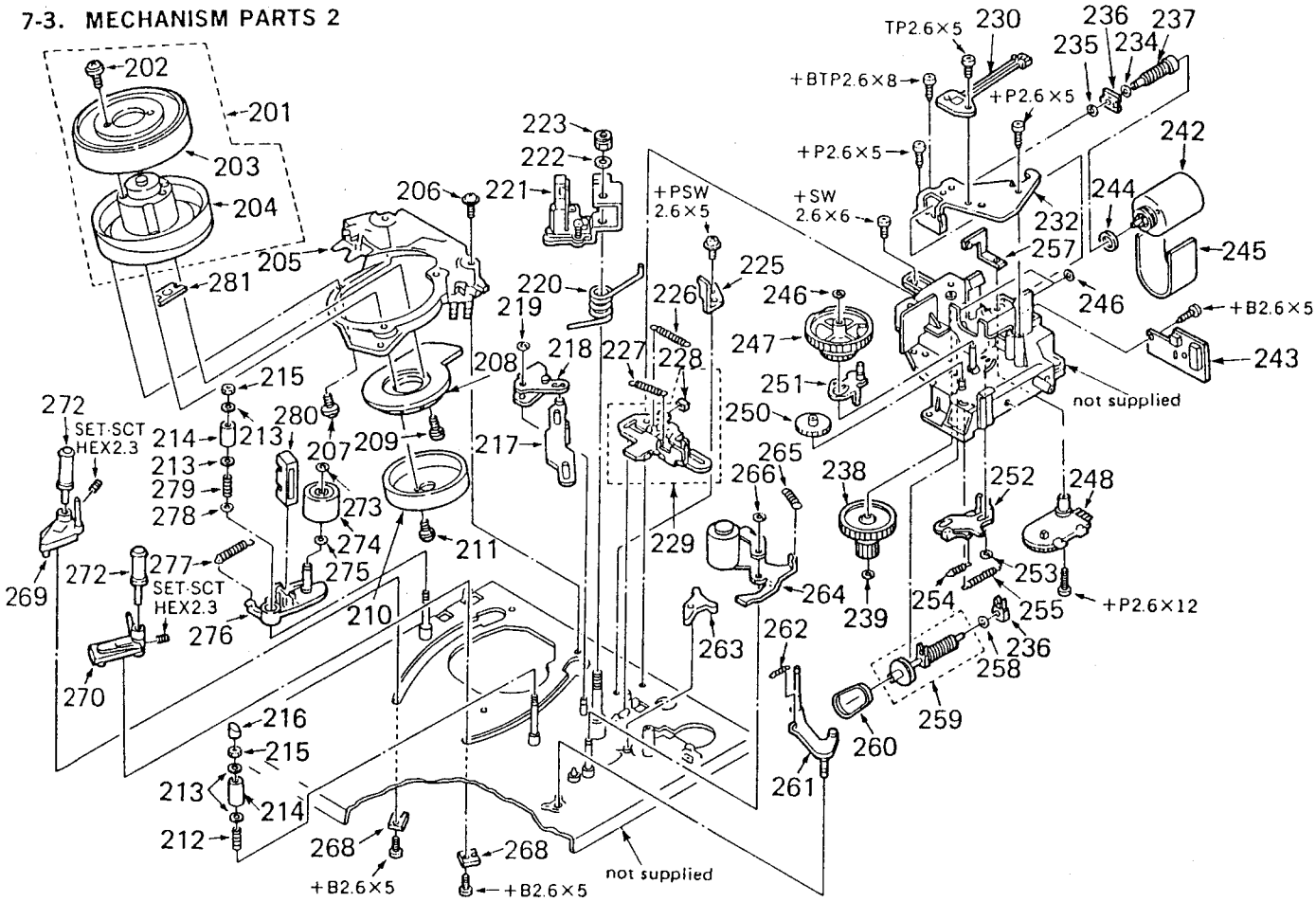
7-2. MECHANISM PARTS 1



No.	Part No.	Description	Remark
101	A-6751-437-A	CASSETTE (MECHANICAL)	
102	3-735-722-01	GEAR, IDLER (LEFT)	
103	3-735-721-01	DOOR, SWITCHING LINK	
104	3-735-734-01	LID	
105	1-808-710-11	PHOTO TRANSISTOR	
107	3-735-720-01	SPRING	
108	3-735-719-01	LEVER (L) ASSY, GEAR	
110	3-735-731-01	GEAR, LOCK	
111	3-735-732-01	LEVER ASSY, PINION	
112	3-735-730-01	GEAR, PINION	
115	3-735-729-01	SW, LEAF	
116	3-735-775-01	SCREW (2X9), +PSW	
117	*3-735-733-01	HOLDER, TR	
118	3-735-728-01	GEAR, IDLER	
119	3-735-725-01	SPRING	
120	3-735-724-01	GEAR, MAIN	
121	3-735-723-01	GEAR ASSY, LEVER	
122	3-735-726-01	SPRING	
123	3-735-727-01	GEAR, IDLER (RIGHT)	
124	3-735-716-01	FRAME, LOWER	
125	3-735-718-01	GEAR (R)	
126	3-735-717-01	ROD ASSY	
127	3-735-715-01	LEVER, SAFETY SW	
128	3-735-714-01	SPRING	
140	3-740-352-01	LEVER ASSY, TENSION	
141	3-735-654-01	SPRING	
142	3-735-690-01	HOLDER ASSY, BAND	
144	3-735-758-01	WASHER (DIA.2.6)	
145	3-735-624-01	REEL ASSY, SUPPLY	
146	3-735-623-01	REEL ASSY, TAKE-UP	
147	3-735-754-01	WASHER (DIA.3), ADJUSTMENT	

No.	Part No.	Description	Remark
147	3-735-754-01	WASHER (DIA.3), ADJUSTMENT	
147	3-735-754-01	WASHER (DIA.3), ADJUSTMENT	
148	3-735-751-01	WASHER (DIA.2)	
149	3-735-620-01	GEAR, SUPPLY REEL	
150	3-735-750-01	WASHER (DIA.2.6), SPECIAL	
151	3-735-621-01	GEAR, TAKE-UP REEL	
152	3-735-622-01	SPRING (T)	
153	3-735-749-01	WASHER (DIA.2)	
157	X-3740-301-1	CLUTCH ASSY, IDLER	
159	1-808-722-11	DIODE LN59 (LED)	
160	*1-589-222-11	PCB ASSY, MC-4	
161	*3-735-662-01	PLATE ASSY, SLIDE	
162	*3-735-626-01	BRAKE (C) ASSY	
163	3-735-627-01	SPRING	
164	3-735-665-01	SPRING	
165	3-735-664-01	BRAKE SUB ASSY, T	
166	3-735-652-01	PULLEY	
167	3-735-781-01	SPRING SUB SUPPLY	
168	*3-735-628-01	BRAKE, SLIDE ACT	
169	3-735-655-01	BRAKE SUB, S	
170	*3-735-661-01	PLATE ASSY, SLIDE	
171	3-735-656-01	BRAKE ASSY, S	
172	3-735-658-01	SPRING	
173	3-735-657-01	BRAKE ASSY, T	
174	3-735-758-01	WASHER (DIA.2.6)	
175	3-735-663-01	LEVER, CONTROL	
176	3-735-751-01	WASHER (DIA.2)	
177	3-735-745-01	SCREW (4X12), +T TP	
178	3-747-627-01	DOOR, CASSETTE	

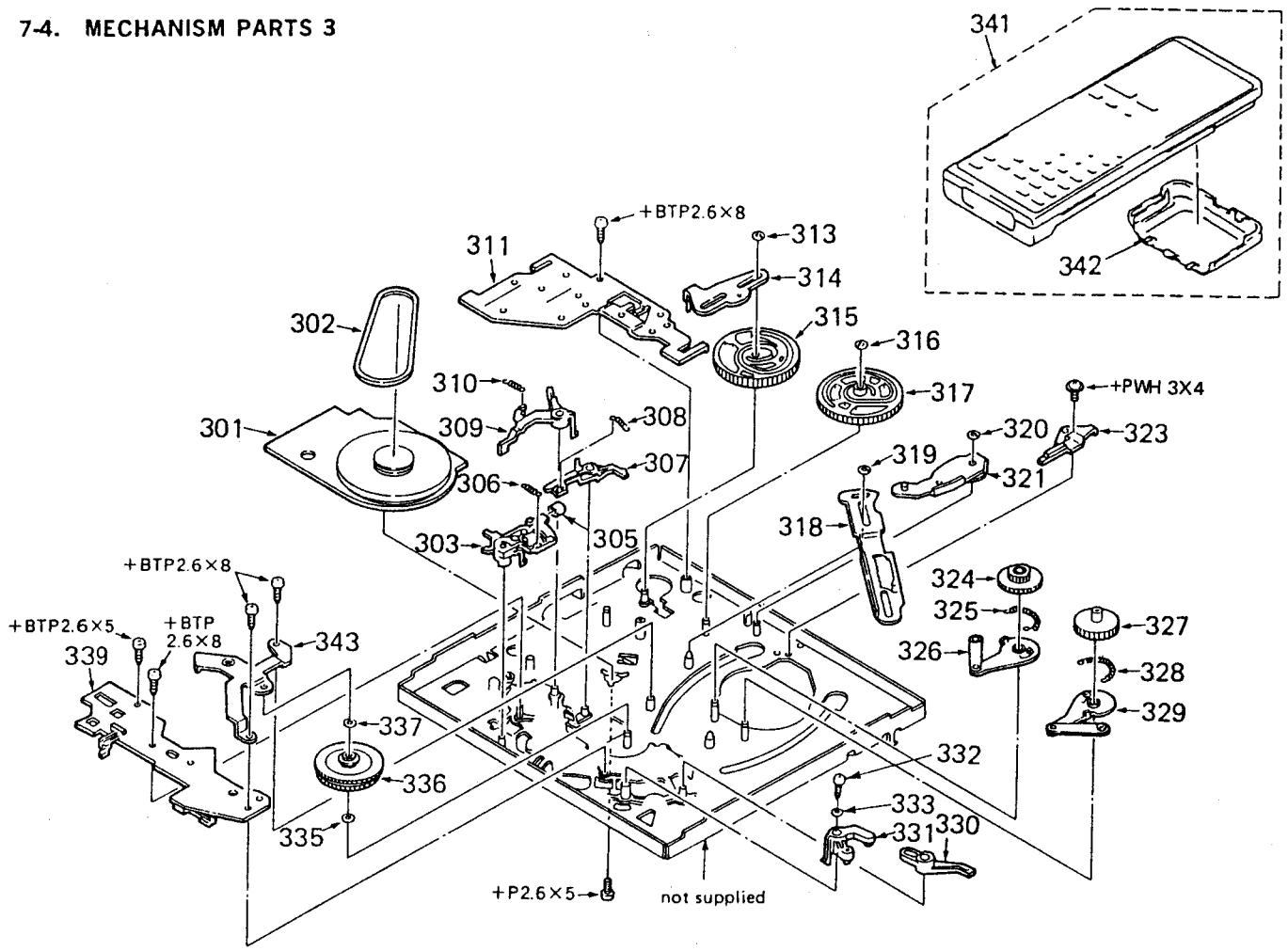
7-3. MECHANISM PARTS 2



No.	Part No.	Description	Remark
201	A-6050-671-A	CYLINDER BOARD, COMPLETE	
202	3-735-776-01	SCREW (3X8), +PW	
203	3-740-375-01	CYLINDER (UPPER) ASSY	
204	3-735-735-01	CYLINDER (LOWER) ASSY	
205	*3-735-737-01	CYLINDER BASE	
206	3-735-748-01	SCREW (3X6), +PWH	
207	3-735-777-01	SCREW (2.6X8), +PWH	
208	1-462-284-11	STATOR	
209	3-735-779-01	SCREW (2.3X8), +PSW	
210	*1-461-017-11	ROTOR	
211	3-735-778-01	SCREW (2.3X6), +PSW	
212	3-735-677-01	SPRING	
213	3-735-767-01	WASHER, SPECIAL	
214	3-735-676-01	GUIDE, TAPE	
215	3-735-689-01	NUT (M3), SPECIAL	
216	3-740-328-01	CAP	
217	*3-735-672-01	SLIDE ASSY, PINCH	
218	*3-735-673-01	PINCH LEVER ASSY	
219	3-735-759-01	WASHER (DIA.3)	
220	3-735-680-01	SPRING	
221	3-735-679-01	BRACKET, COMPL	
222	3-735-681-01	SPACER	
223	3-735-682-01	NUT (M5), SPECIAL	
225	*3-735-683-01	BRACKET, STOPPER	
226	3-735-669-01	SPRING	
227	3-735-670-01	SPRING	
228	3-735-668-01	DAMPER	
229	3-747-606-01	CAM ASSY, SLIDE	
230	3-735-711-01	SENSOR ASSY, DEW	
232	*3-740-356-01	BRACKET, HOLDER	
234	3-740-357-01	WASHER (DIA2.1)	
235	3-741-412-01	SPECIAL WASHER	
236	3-735-696-01	HOLDER, WORM	
237	3-735-706-01	WORM ASSY, F	
238	3-735-697-01	GEAR ASSY, HELICAL	
239	3-735-756-01	WASHER (DIA.3)	
241	*3-740-365-01	DAMPER, MOTOR	

No.	Part No.	Description	Remark
242	3-735-707-01	MOTOR ASSY, L	
243	*1-589-223-11	PC BOARD ASSY, MC-3	
244	3-735-708-01	DAMPER, WORM	
245	*3-740-358-01	DAMPER, MOTOR	
246	3-735-773-01	WASHER (DIA.4)	
247	3-735-703-01	GEAR (F), HELICAL	
248	1-571-930-11	SWITCH, ROTARY	
250	3-735-704-01	GEAR	
251	*3-740-366-01	LEVER, FRONT	
252	*3-735-700-01	SLIDE ASSY, F	
253	3-735-756-01	WASHER (DIA.3)	
254	3-735-702-01	SPRING	
255	3-735-701-01	SPRING	
257	3-740-354-01	PLATE, NUT	
258	3-735-774-01	WASHER (DIA.2)	
259	3-735-695-01	GEAR ASSY, WORM	
260	3-735-709-01	BELT (LOADING)	
261	3-735-659-01	LEVER ASSY, REV (G)	
262	3-735-660-01	SPRING	
263	3-735-671-01	LEVER, ACT BRAKE	
264	3-735-674-01	PINCH ROLLER, COMPL	
265	3-735-675-01	SPRING	
266	3-735-757-01	WASHER (DIA.3.6)	
268	3-735-631-01	PLATE, GUIDE	
269	3-746-730-01	ROLLER (S) ASSY, BASE	
270	3-746-731-01	ROLLER (T) ASSY, BASE	
272	3-735-630-01	ROLLER ASSY, GUIDE	
273	3-735-769-01	WASHER (DIA.1.5)	
274	3-735-685-01	ROLLER, IMPEDANCE	
275	3-735-771-01	WASHER (DIA.2), SPECIAL	
276	3-747-605-01	LEVER ASSY, FE HEAD	
277	3-735-686-01	SPRING	
278	3-735-770-01	WASHER (DIA.6)	
279	3-735-688-01	SPRING	
280	3-735-687-01	HEAD, FTE	
281	3-735-738-01	SPACER, MOTOR	

7-4. MECHANISM PARTS 3



No.	Part No.	Description	Remark
301	3-740-369-01	MOTOR, CAPSTAN	
302	3-735-691-01	BELT (REEL DRIVE)	
303	3-747-602-01	CLUTCH ASSY, LEVER	
305	3-735-645-01	DAMPER, LEVER CLUTCH	
306	3-735-646-01	SPRING	
307	3-735-647-01	LEVER, CONVERSION CLUTCH	
308	3-735-648-01	SPRING	
309	3-735-649-01	BRAKE ASSY, CAP	
310	3-735-650-01	SPRING	
311	*3-735-692-01	BRACKET	
313	3-735-759-01	WASHER (DIA.3)	
314	*3-735-643-01	PLATE ASSY, CAM	
315	3-735-639-01	CAM, MODE	
316	3-735-756-01	WASHER (DIA.3)	
317	3-735-640-01	CAM, MAIN	
318	3-735-642-01	RACK, LOAD	
319	3-735-758-01	WASHER (DIA.2.6)	
320	3-735-757-01	WASHER (DIA.3.6)	
321	3-735-641-01	LEVER ASSY, LOAD CAM	
323	3-735-693-01	PLATE ASSY, GROUND	
324	3-735-638-01	GEAR (T)	

No.	Part No.	Description	Remark
325	3-735-637-01	SPRING (T)	
326	3-735-636-01	LOAD (T) ASSY, LEVER	
327	3-735-635-01	GEAR (S)	
328	3-735-634-01	SPRING	
329	3-735-633-01	LOAD (S) ASSY, LEVER	
330	3-735-766-01	LEVER, RETURN TENSION	
331	3-740-368-01	LEVER ASSY, CONTROL	
332	3-735-762-01	SCREW (2.3X12), +PTP	
	3-735-763-01	SCREW (2.3X5), +PTP	
333	3-735-764-01	WASHER (DIA.2.3)	
	3-735-761-01	WASHER (DIA.2.6)	
335	3-735-760-01	WASHER (DIA.3), SPECIAL	
336	3-735-651-01	GEAR ASSY, FRICTION	
337	3-735-758-01	WASHER (DIA.2.6)	
339	*1-589-272-11	COMPL, MC-1	
339-1	1-571-931-11	SWITCH, LEAF (FRONT LOADING) (MC-1)	
339-2	1-571-932-11	SWITCH, LEAF (ERASURE-PREVENSION) (MC-1)	
339-3	1-808-723-11	PHOTO COUPLER (T REEL SENSOR) (MC-1)	
339-4	3-735-744-01	SPACER, PHOTO SENSOR (MC-1)	
341	1-465-564-21	REMOTE CONTROL (RMT-V262C)	
342	2-181-754-01	LID, BATTERY CASE	
343	3-740-397-01	BRACKET PULLEY	

SECTION 8
ELECTRICAL PARTS LIST

VP-1 PW-1 PW-2 TM-2

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- Items marked "★" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- If there are two or more same circuits in a set such as a stereophonic machine, only typical circuit parts may be indicated and capacitors and resistors in other same circuits may be omitted.

CAPACITORS:
MF: μF, PF: μμF.

RESISTORS
- All resistors are in ohms.
- F: nonflammable

COILS
- MMH: mH, UH: μH

SEMICONDUCTORS
In each case, U: μ, for example:
UA...: μA..., UPA...: μPA...,
UPC...: μPC, UPD...: μPD...

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description			Remark
	*A-6725-849-A	VP-1 BOARD, COMPLETE			
		**********			
		CAPACITOR			
C1801	1-161-039-00	CERAMIC	0.001MF	10%	50V
C1803	1-126-094-00	ELECT	4.7MF	20%	25V
C1804	1-162-290-31	CERAMIC	470PF	10%	50V
C1805	1-162-280-31	CERAMIC	82PF	10%	50V
C1806	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1807	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1808	1-161-494-00	CERAMIC	0.022MF	30%	25V
C1809	1-124-589-11	ELECT	47MF	20%	16V
C1810	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1811	1-161-494-00	CERAMIC	0.022MF	30%	25V
C1812	1-124-438-00	ELECT	1MF	20%	50V
C1813	1-161-043-00	CERAMIC	0.0022MF	10%	50V
C1814	1-161-057-00	CERAMIC	0.033MF	10%	50V
C1815	1-101-880-00	CERAMIC	47PF	5%	50V
C1816	1-101-880-00	CERAMIC	47PF	5%	50V
C1817	1-161-057-00	CERAMIC	0.033MF	10%	50V
C1818	1-161-043-00	CERAMIC	0.0022MF	10%	50V
		CONNECTOR			
CN181	- - -	SOCKET 8P			
CN184	1-580-017-11	SOCKET 5P			
		IC			
IC181	8-759-820-98	IC LA7320			
		COIL			
L1801	1-410-520-11	INDUCTOR	82UH		
L1802	1-410-519-11	INDUCTOR	68UH		
		VARIABLE RESISTOR			
VR181	1-237-500-21	RES, ADJ, CERMET 1K			
VR182	1-237-500-21	RES, ADJ, CERMET 1K			
**********					
	*A-6725-851-A	PW-1 BOARD, COMPLETE			
		**********			
	⚠1-575-324-11	CORD, POWER			
		CAPACITOR			
C5001	- - -		0.0047MF		250V
C5101	- - -	ELECT	2200MF	20%	25V
C5102	1-124-962-11	ELECT	2200MF	20%	25V
C5103	- - -	ELECT	3300MF	20%	16V
C5104	1-124-487-51	ELECT	47MF	20%	63V
C5105	1-124-131-00	ELECT	47MF	20%	100V
C5106	1-136-165-00	FILM	0.1MF	5%	50V
C5107	1-123-359-00	ELECT	47MF	20%	35V
C5108	1-123-356-00	ELECT	10MF	20%	25V
C5109	1-123-356-00	ELECT	10MF	20%	25V
		CONNECTOR			
CN501	1-580-010-11	SOCKET 3P			
CN511	- - -	SOCKET 11P			
		DIODE			
D5101	8-719-200-02	DIODE 10E-2			
D5102	8-719-200-02	DIODE 10E-2			
D5103	8-719-911-55	DIODE U05G			
D5104	8-719-911-55	DIODE U05G			
D5105	8-719-300-45	DIODE EM-1Z			
D5106	8-719-300-45	DIODE EM-1Z			
D5107	8-719-300-45	DIODE EM-1Z			
D5108	8-719-300-45	DIODE EM-1Z			
D5109	1-809-009-11	DIODE 1SS244-T-77			
D5110	1-809-009-11	DIODE 1SS244-T-77			
		FUSE			
F5001⚠	1-532-235-00	FUSE, TIME-LAG (T. 315mA 250V)			
F5101⚠	1-532-215-00	FUSE, TIME-LAG (T. 800mA 250V)			
F5102⚠	1-532-259-00	FUSE, TIME-LAG (T. 1.6A 250V)			
F5103⚠	1-532-203-00	FUSE, TIME-LAG (T. 2A 250V)			
F5104⚠	1-532-235-00	FUSE, TIME-LAG (T. 315mA 250V)			
		TRANSFORMER			
T5001⚠	1-450-172-11	TRANSFORMER, POWER			
**********					
	*A-6725-848-A	PW-2 BOARD, COMPLETE			
		**********			
		IC			
IC521	1-809-031-11	IC STK5446			
**********					
	*A-6725-856-A	TM-2 BOARD, COMPLETE			
		**********			
	*3-746-720-01	HOLDER			
		CAPACITOR			
C7120	1-162- -	CERAMIC	0.1MF		
		CONNECTOR			
CN724	1-580-016-11	SOCKET 7P			
CN781	1-537-293-11	TERMINAL BOARD (VIDEO AUDIO IN)			
CN784	*1-569-745-11	SOCKET			
CN794	- - -	SOCKET 5P			

TM-2 CP-1

Ref.No	Part No.	Description	Remark
		DIODE	
D7181	1-809-068-11	DIODE SLV-31MC3F (POWER)	
		RECIEVER	
RR711	1-466-549-11	RECIEVER, REMOTE CONTROL	
		SWITCH	
S7115	1-572-415-11	PUSH SWITCH (POWER)	
S7181	1-572-416-11	SLIDE SWITCH (LINE SELECT)	
		VARIABLE RESISTOR	
VR771	1-241-161-11	VR ROTARY 10K (PICTURE)	

****

* CP-1 BOARD
****

	1-465-353-11	PACK, TUNER
	1-466-269-11	PACK, IF
	1-466-392-11	MODULATOR, RF
	1-535-855-11	TERMINAL
	1-575-925-11	CORD
	3-741-482-01	BRACKET
	7-685-647-79	SCREW +BVTP 3X10 TYPE 2, SLIT
		TRANSISTOR
B1001	8-729-900-89	TRANSISTOR DTC144ES
B1201	8-729-900-89	TRANSISTOR DTC144ES
B3001	8-729-900-80	TRANSISTOR DTC114ES
B3002	8-729-900-89	TRANSISTOR DTC144ES
B3501	8-729-900-89	TRANSISTOR DTC144ES
B3502	8-729-900-89	TRANSISTOR DTC144ES
B3503	8-729-900-89	TRANSISTOR DTC144ES
B6001	8-729-900-89	TRANSISTOR DTC144ES
B6002	8-729-900-65	TRANSISTOR DTA144ES
B6003	8-729-900-89	TRANSISTOR DTC144ES
		CAPACITOR

C1001	1-162-195-31	CERAMIC	4.7PF	10%	50V
C1002	1-162-289-31	CERAMIC	390PF	10%	50V
C1003	1-101-880-00	CERAMIC	47PF	5%	50V
C1004	1-124-465-00	ELECT	0.47MF	20%	50V
C1005	1-162-281-31	CERAMIC	91PF	10%	50V
C1006	1-162-816-11	CERAMIC CHIP	180PF	5%	50V
C1007	1-162-293-31	CERAMIC	820PF	10%	50V
C1008	1-124-767-00	ELECT	2.2MF	20%	50V
C1009	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1010	1-124-257-00	ELECT	2.2MF	20%	50V
C1011	1-124-465-00	ELECT	0.47MF	20%	50V
C1012	1-162-280-31	CERAMIC	82PF	10%	50V
C1013	1-164-073-11	CERAMIC	100PF	10%	50V
C1014	1-130-493-00	MYLAR	0.068MF	5%	50V

Ref.No	Part No.	Description			Remark
C1015	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1016	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1017	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1018	1-126-154-11	ELECT	47MF	20%	6.3V
C1019	1-124-257-00	ELECT	2.2MF	20%	50V
C1020	1-126-157-11	ELECT	10MF	20%	16V
C1021	1-124-257-00	ELECT	2.2MF	20%	50V
C1023	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1024	1-124-234-00	ELECT	22MF	20%	10V
C1025	1-124-465-00	ELECT	0.47MF	20%	50V
C1031	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1032	1-124-589-11	ELECT	47MF	20%	16V
C1033	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1034	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1035	1-124-589-11	ELECT	47MF	20%	16V
C1036	1-124-438-00	ELECT	1MF	20%	50V
C1037	1-101-880-00	CERAMIC	47PF	5%	50V
C1038	1-162-195-31	CERAMIC	4.7PF	10%	50V
C1039	1-101-880-00	CERAMIC	47PF	5%	50V
C1040	1-126-094-11	ELECT	4.7MF	20%	25V
C1041	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1042	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1043	1-162-290-31	CERAMIC	470PF	10%	50V
C1051	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1058	1-101-880-00	CERAMIC	47PF	5%	50V
C1059	1-164-064-11	CERAMIC	56PF	5%	50V
C1060	1-126-154-11	ELECT	47MF	20%	6.3V
C1061	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1062	1-162-292-31	CERAMIC	680PF	10%	50V
C1063	1-162-211-31	CERAMIC	33PF	5%	50V
C1065	1-162-211-31	CERAMIC	33PF	5%	50V
C1101	1-161-494-00	CERAMIC	0.022MF	30%	25V
C1102	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1103	1-124-438-00	ELECT	1MF	20%	50V
C1104	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1105	1-124-438-00	ELECT	1MF	20%	50V
C1106	1-124-438-00	ELECT	1MF	20%	50V
C1107	1-161-494-00	CERAMIC	0.022MF	30%	25V
C1108	1-161-021-11	CERAMIC	0.047MF	10%	25V
C1109	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1112	1-124-438-00	ELECT	1MF	20%	50V
C1113	1-161-021-11	CERAMIC	0.047MF	10%	25V
C1114	1-162-214-31	CERAMIC	43PF	5%	50V
C1115	1-162-281-31	CERAMIC	91PF	10%	50V
C1116	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1117	1-126-154-11	ELECT	47MF	20%	6.3V
C1118	1-164-073-11	CERAMIC	100PF	10%	50V
C1119	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1121	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1124	1-163-017-00	CERAMIC CHIP	0.0047MF	10%	50V
C1125	1-164-072-11	CERAMIC	120PF	5%	50V
C1126	1-161-379-00	CERAMIC	0.01MF	20%	25V
C1201	1-102-820-00	CERAMIC	330PF	5%	50V

When indicating parts by reference number, please include the board name.

Ref.No	Part No.	Description			Remark
C1281	1-162-290-31	CERAMIC	470PF	10%	50V
C1401	1-126-094-11	ELECT	4.7MF	20%	25V
C1602	1-126-154-11	ELECT	47MF	20%	6.3V
C1605	1-124-472-11	ELECT	470MF	20%	6.3V
C1608	1-124-234-00	ELECT	22MF	20%	10V
C1609	1-124-791-11	ELECT	1MF		16V
C1631	1-162-211-31	CERAMIC	33PF	5%	50V
C1632	1-164-060-11	CERAMIC	39PF	5%	50V
C2001	1-124-438-00	ELECT	1MF	20%	50V
C2002	1-162-293-31	CERAMIC	820PF	10%	50V
C2004	1-124-229-00	ELECT	33MF	20%	6.3V
C2005	1-161-054-00	CERAMIC	0.018MF	10%	50V
C2006	1-124-465-00	ELECT	0.47MF	20%	50V
C2008	1-161-327-00	CERAMIC	0.0033MF	30%	50V
C2009	1-126-154-11	ELECT	47MF	20%	6.3V
C2010	1-126-157-11	ELECT	10MF	20%	16V
C2013	1-161-494-00	CERAMIC	0.022MF	30%	25V
C2016	1-124-438-00	ELECT	1MF	20%	50V
C2017	1-124-242-00	ELECT	33MF	20%	16V
C2018	1-126-094-11	ELECT	4.7MF	20%	25V
C2019	1-124-589-11	ELECT	47MF	20%	16V
C2020	1-162-286-31	CERAMIC	220PF	10%	50V
C2021	1-130-309-00	FILM	0.033MF	5%	100V
C2022	1-161-379-00	CERAMIC	0.01MF	20%	25V
C2024	1-161-379-00	CERAMIC	0.01MF	20%	25V
C2025	1-161-494-00	CERAMIC	0.022MF	30%	25V
C2151	1-161-039-00	CERAMIC	0.001MF	10%	50V
C2152	1-161-039-00	CERAMIC	0.001MF	10%	50V
C3001	1-161-379-00	CERAMIC	0.01MF	20%	25V
C3002	1-161-772-11	CERAMIC	0.1MF	10%	25V
C3003	1-124-257-00	ELECT	2.2MF	20%	50V
C3004	1-124-229-00	ELECT	33MF	20%	6.3V
C3005	1-161-772-11	CERAMIC	0.1MF	10%	25V
C3006	1-161-772-11	CERAMIC	0.1MF	10%	25V
C3007	1-161-772-11	CERAMIC	0.1MF	10%	25V
C3008	1-126-155-11	ELECT	100MF	20%	6.3V
C3009	1-161-772-11	CERAMIC	0.1MF	10%	25V
C3012	1-136-956-11	ELECT	0.047MF		5.5V
C3502	1-161-772-11	CERAMIC	0.1MF	10%	25V
C3503	1-130-487-00	MYLAR	0.022MF	5%	50V
C3504	1-130-483-00	MYLAR	0.01MF	5%	50V
C3506	1-130-484-00	MYLAR	0.012MF	5%	50V
C3507	1-130-494-11	MYLAR	0.082MF	5%	50V
C3508	1-161-053-00	CERAMIC	0.015MF	10%	50V
C3509	1-161-329-00	CERAMIC	0.0068MF	30%	25V
C3510	1-124-234-00	ELECT	22MF	20%	16V
C3511	1-124-234-00	ELECT	22MF	20%	16V
C3512	1-161-053-00	CERAMIC	0.015MF	10%	50V
C3513	1-130-481-00	MYLAR	0.0068MF	5%	50V
C3514	1-136-165-00	FILM	0.1MF	5%	50V
C3515	1-161-329-00	CERAMIC	0.0068MF	30%	25V
C3516	1-124-234-00	ELECT	22MF	20%	16V
C3517	1-124-234-00	ELECT	22MF	20%	16V

Ref.No	Part No.	Description			Remark
C3518	1-161-048-00	CERAMIC	0.0056MF	10%	50V
C3519	1-161-048-00	CERAMIC	0.0056MF	10%	50V
C3520	1-136-167-00	FILM	0.15MF	5%	50V
C3521	1-126-154-11	ELECT	47MF	20%	6.3V
C3522	1-161-379-00	CERAMIC	0.01MF	20%	25V
C3523	1-124-438-00	ELECT	1MF	20%	50V
C3524	1-162-282-31	CERAMIC	100PF	10%	50V
C3525	1-124-767-00	ELECT	2.2MF	20%	50V
C3526	1-124-464-11	ELECT	0.22MF	20%	50V
C3527	1-124-438-00	ELECT	1MF	20%	50V
C3528	1-161-039-00	CERAMIC	0.001MF	10%	50V
C3529	1-161-379-00	CERAMIC	0.01MF	20%	25V
C3530	1-161-061-11	CERAMIC	0.068MF	10%	50V
C3533	1-161-039-00	CERAMIC	0.001MF	10%	50V
C3534	1-161-039-00	CERAMIC	0.001MF	10%	50V
C3535	1-124-229-00	ELECT	33MF	20%	6.3V
C3536	1-161-375-00	CERAMIC	0.0022MF	20%	50V
C3537	1-126-162-11	ELECT	3.3MF	20%	50V
C3538	1-126-157-11	ELECT	10MF	20%	16V
C3539	1-162-283-31	CERAMIC	120PF	10%	50V
C3540	1-162-286-31	CERAMIC	220PF	10%	50V
C5402	1-126-154-11	ELECT	47MF	20%	6.3V
C6001	1-161-772-11	CERAMIC	0.1MF	10%	25V
C6002	1-126-094-11	ELECT	4.7MF	20%	25V
C6003	1-124-438-00	ELECT	1MF	20%	50V
C6004	1-136-165-00	FILM	0.1MF	5%	50V
C6005	1-126-094-11	ELECT	4.7MF	20%	25V
C6006	1-124-455-00	ELECT	100MF	20%	16V
C6007	1-101-006-00	CERAMIC	0.047MF		50V
C6008	1-124-438-00	ELECT	1MF	20%	50V
C6009	1-123-357-00	ELECT	22MF	20%	50V
C6010	1-161-063-00	CERAMIC	0.1MF	10%	50V
C6601	1-126-155-11	ELECT	100MF	20%	6.3V
C6602	1-126-155-11	ELECT	100MF	20%	6.3V

CONNECTOR

CN101	1-580-011-11	SOCKET 8P
CN171	1-580-030-11	CONNECTOR 10P
CN201	1-569-069-11	SOCKET 5P
CN302	1-580-019-11	SOCKET 4P
CN303	1-569-071-11	SOCKET 6P
CN351	1-580-018-11	SOCKET 6P
CN352	1-580-020-11	SOCKET 8P
CN353	*1-569-747-11	SOCKET 3P
CN541	1-580-012-11	SOCKET 11P
CN691	1-580-023-11	CONNECTOR 13P
CN851	1-580-025-11	SOCKET 9P

DIODE

D1001	8-719-912-20	DIODE 1SS120
D1002	8-719-912-20	DIODE 1SS120
D1003	8-719-912-20	DIODE 1SS120
D1004	8-719-912-20	DIODE 1SS120

When indicating parts by reference number, please include the board name.

CP-1

Ref.No	Part No.	Description	Remark
D1031	8-719-110-13	DIODE RD9.1ESB2	
D1604	8-719-912-20	DIODE 1SS120	
D3001	8-719-109-89	DIODE RD5.6ESB2	
D3002	8-719-110-08	DIODE RD8.2ESB2	
D3003	8-719-912-20	DIODE 1SS120	
D3501	8-719-912-20	DIODE 1SS120	
D3502	8-719-912-20	DIODE 1SS120	
D3503	8-719-912-20	DIODE 1SS120	
D3504	8-719-912-20	DIODE 1SS120	
D3505	8-719-912-20	DIODE 1SS120	
D3506	8-719-912-20	DIODE 1SS120	
D3507	8-719-912-20	DIODE 1SS120	
D5403	8-719-110-31	DIODE RD12ESB2	
D5404	1-809-009-11	DIODE 1SS244-T-77	
D5405	8-719-110-78	DIODE RD33ESB2	
D5406	8-719-110-18	DIODE RD10ESB3	
		DELAY LINE	
DL131	1-415-765-11	DELAY LINE 2H	
		IC	
IC101	8-759-821-84	IC LA7340	
IC102	1-808-885-11	IC TL8709P	
IC111	8-759-822-29	IC LA7332	
IC161	8-759-820-48	IC LA7221	
IC201	1-808-746-11	IC LA7295	
IC301	1-809-111-11	IC LC66308A-4449	
IC302	1-808-846-11	IC LB1641	
IC303	8-759-103-93	IC UPC393C	
IC304	8-759-403-44	IC MN1280-S	
IC351	1-808-847-11	IC LC7416-8080	
IC352	1-808-848-11	IC LA7123	
IC601	8-759-157-40	IC UPC574J	
IC602	1-808-855-11	IC M6M80021P	
		COIL	
L1001	1-410-519-11	INDUCTOR 68UH	
L1031	1-410-520-11	INDUCTOR 82UH	
L1033	1-410-316-11	INDUCTOR 1UH	
L1054	1-410-511-11	INDUCTOR 15UH	
L1055	1-410-511-11	INDUCTOR 15UH	
L1056	1-410-521-11	INDUCTOR 100UH	
L1057	1-412-454-11	HF CHOKE 5.6UH	
L1058	1-410-518-41	INDUCTOR 56UH	
L1101	1-410-512-11	INDUCTOR 18UH	
L1102	1-410-322-11	INDUCTOR 3.3UH	
L1103	1-410-511-11	INDUCTOR 15UH	
L1104	1-412-456-11	HF CHOKE 1MH	
L1105	1-412-455-11	HF CHOKE 47UH	
L1631	1-410-521-11	INDUCTOR 100UH	
L2002	1-412-270-11	CHOKE, HF 10MMH	
L2003	1-410-491-11	INDUCTOR 560UH	

Ref.No	Part No.	Description	Remark
L6601	1-408-411-00	INDUCTOR 15UH	
L6602	1-408-411-00	INDUCTOR 15UH	
		TRANSISTOR	
Q1001	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q1002	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1003	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1031	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q1052	8-729-884-02	TRANSISTOR 2SC2840-D	
Q1054	8-729-884-02	TRANSISTOR 2SC2840-D	
Q1055	8-729-884-02	TRANSISTOR 2SC2840-D	
Q1101	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q1102	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1103	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1104	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1105	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1106	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1151	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q1401	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1402	8-729-140-97	TRANSISTOR 2SB734-34	
Q1403	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q1404	1-809-066-11	TRANSISTOR 2SA1707-T-AN	
Q1601	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q1602	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q1631	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q2001	8-729-873-40	TRANSISTOR 2SD734-E	
Q5401	1-808-850-11	TRANSISTOR 2SA1703-S-AN	
Q5402	1-809-067-11	TRANSISTOR 2SC4483-S-AN	
Q5403	8-729-140-97	TRANSISTOR 2SB734-34	
Q5404	8-729-140-97	TRANSISTOR 2SB734-34	
Q6001	8-729-103-12	TRANSISTOR 2SK68A-M	
Q6002	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q6003	8-729-119-78	TRANSISTOR 2SC2785-HFE	
		RESISTOR	
R5404⚠	1-219-144-11	820	
R5408⚠	1-212-873-11	FUSIBLE 47 5% 1/4W F	
		COIL	
T2001	1-406-366-11	COIL, OSC	
		VARIABLE RESISTOR	
VR101	1-228-990-00	RES, ADJ, METAL GLAZE 1K	
VR102	1-228-994-00	RES, ADJ, METAL GLAZE 10K	
VR103	1-241-214-11	SEMI VR 20KB	
VR104	1-228-994-00	RES, ADJ, METAL GLAZE 10K	
VR105	1-228-990-00	RES, ADJ, METAL GLAZE 1K	
VR201	1-228-997-00	RES, ADJ, METAL GLAZE 100K	
VR202	1-228-994-00	RES, ADJ, METAL GLAZE 10K	
VR351	1-228-998-00	RES, ADJ, METAL GLAZE 220K	

When indicating parts by reference number, please include the board name.

Note: The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref.No	Part No.	Description			Remark
		CRYSTAL			
X1101	1-577-667-11	CRYSTA, OSC			
		FILTER			
XF101	1-236-602-11	LC PACK			
XF111	1-236-603-11	LC PACK			
XF301	1-577-682-11	RESONATOR, CERAMIC			
**********					
	*A-6725-935-A	TB-1 BOARD, COMPLETE			
		**********			
		TRANSISTOR			
B8501	8-729-900-89	TRANSISTOR DTC144ES			
		CAPACITOR			
C3531	1-124-589-11	ELECT	47MF	20%	16V
C8501	1-126-157-11	ELECT	10MF	20%	16V
C8502	1-126-157-11	ELECT	10MF	20%	16V
C8503	1-126-157-11	ELECT	10MF	20%	16V
C8504	1-126-157-11	ELECT	10MF	20%	16V
C8552	1-124-589-11	ELECT	47MF	20%	16V
C8601	1-161-379-00	CERAMIC	0.01MF	20%	25V
C8602	1-124-589-11	ELECT	47MF	20%	16V
C8603	1-124-589-11	ELECT	47MF	20%	16V
C8604	1-126-157-11	ELECT	10MF	20%	16V
C8605	1-124-589-11	ELECT	47MF	20%	16V
		CONNECTOR			
CN301	- - -	7P			
CN304	- - -	12P			
CN601	- - -	10P			
CN602	- - -	7P			
CN852	1-580-024-11	SOCKET 6P			
CN854	*1-569-745-11	SOCKET 5P			
		IC			
IC851	8-759-711-23	IC NJM2234L			
IC861	8-759-800-81	IC LA7016			
		PLUG			
JK851	1-580-130-11	SOCKET (RCA) (VIDEO OUT)			
JK852	1-580-130-11	SOCKET (RCA) (VIDEO IN)			
JK853	1-580-129-11	SOCKET (RCA) (AUDIO OUT)			
JK854	1-580-129-11	SOCKET (RCA) (AUDIO IN)			
		VARIABLE RESISTOR			
VR361	1-241-160-11	VR ROTARY 100K (SP)			
**********					

Ref.No	Part No.	Description			Remark
	*A-6725-850-A	TN-7 BOARD, COMPLETE			
		**********			
		TRANSISTOR			
B6901	8-729-805-61	TRANSISTOR 2SC3395-TB			
		CAPACITOR			
C6901	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C6902	1-126-157-11	ELECT	10MF	20%	16V
C6903	1-163-063-00	CERAMIC CHIP	0.022MF	10%	50V
C6904	1-124-464-11	ELECT	0.22MF	20%	50V
C6921	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C6922	1-164-076-11	CERAMIC	180PF	10%	50V
C6923	1-163-009-11	CERAMIC CHIP	0.001MF	10%	50V
C6924	1-136-502-11	MYLAR	0.33MF	5%	50V
C6925	1-130-499-00	MYLAR	0.22MF	5%	50V
		DIODE			
D6901	8-719-940-44	DIODE DCB015-TB			
D6902	8-719-914-49	DIODE DA204K-T-146			
		IC			
IC691	8-759-800-65	IC LA7910			
		TRANSISTOR			
Q6901	8-729-800-55	TRANSISTOR 2SC2812L4-TB			
Q6902	1-809-065-11	TRANSISTOR 2SA1338-4-TB			
Q6903	8-729-800-55	TRANSISTOR 2SC2812L4-TB			
Q6921	8-729-345-85	TRANSISTOR 2SC458K-5			
		TRANSFORMER			
T6901	1-426-511-11	TRANSFORMER, IF			
**********					
	*A-6725-862-A	VD-1 BOARD, COMPLETE			
		**********			
		TRANSISTOR			
B1701	8-729-805-61	TRANSISTOR 2SC3395-TB			
		CAPACITOR			
C1701	1-102-129-00	CERAMIC	0.01MF	10%	50V
C1702	1-164-073-11	CERAMIC	100PF	10%	50V
C1703	1-126-157-11	ELECT	10MF	20%	16V
C1704	1-164-004-11	CERAMIC CHIP	0.1MF	10%	25V
C1705	1-126-157-11	ELECT	10MF	20%	16V
C1706	1-102-129-00	CERAMIC	0.01MF	10%	50V
		DIODE			
D1701	8-719-912-20	DIODE 1SS120			

When indicating parts by reference number, please include the board name.

VD-1 TM-1

Ref.No	Part No.	Description			Remark
		IC			
IC171	1-808-895-11	IC BA7025L			
		TRANSISTOR			
Q1701	8-729-881-23	TRANSISTOR 2SC2812-L7			
		FILTER			
XF171	1-236-633-11	FILTER			
XF172	1-424-313-11	COIL, CHOKE			
**********					
	A-6725-939-A	TM-1 BOARD, COMPLETE			
		**********			
	*3-746-719-01	HOLDER			
A7101	1-519-564-11	VFD			
		CAPACITOR			
C7102	1-102-953-00	CERAMIC	18PF	5%	50V
C7103	1-102-958-00	CERAMIC	20PF	5%	50V
C7104	1-161-379-00	CERAMIC	0.01MF	20%	25V
C7105	1-124-234-00	ELECT	22MF	20%	16V
C7106	1-161-379-00	CERAMIC	0.01MF	20%	25V
C7107	1-161-379-00	CERAMIC	0.01MF	20%	25V
C7108	1-124-465-00	ELECT	0.47MF	20%	50V
C7111	1-161-063-00	CERAMIC	0.1MF	10%	50V
C7113	1-126-157-11	ELECT	10MF	20%	16V
C7114	1-161-063-00	CERAMIC	0.1MF	10%	50V
		CONNECTOR			
CN711	1-580-014-11	SOCKET 12P			
CN712	*1-569-746-11	SOCKET 7P			
CN713	1-580-013-11	SOCKET 10P			
CN714	1-580-021-11	PLUG 7P			
		DIODE			
D7101	8-719-912-20	DIODE 1SS120			
D7103	8-719-912-20	DIODE 1SS120			
D7104	8-719-912-20	DIODE 1SS120			
D7105	8-719-912-20	DIODE 1SS120			
D7107	8-719-912-20	DIODE 1SS120			
D7108	8-719-912-20	DIODE 1SS120			
D7110	8-719-912-20	DIODE 1SS120			
D7124	8-719-912-20	DIODE 1SS120			
		IC			
IC711	1-809-071-11	IC M50958-294SP			
IC712	8-759-403-39	IC MN1280-L			
IC713	- - -	IC LC6527H-4389			
		SWITCH			
S7101	1-572-415-11	PUSH SWITCH (PLAY)			
S7102	1-572-415-11	PUSH SWITCH (STOP)			
S7103	1-572-415-11	PUSH SWITCH (PAUSE)			
S7106	1-572-415-11	PUSH SWITCH (CH UP)			
S7108	1-572-415-11	PUSH SWITCH (TR +/FT +)			
S7113	1-572-415-11	PUSH SWITCH (REC)			
S7114	1-572-415-11	PUSH SWITCH (EJECT)			
S7118	1-572-415-11	PUSH SWITCH (CH DOWN)			
S7120	1-572-415-11	PUSH SWITCH (TR -/FT -)			
S7125	1-572-415-11	PUSH SWITCH (REW)			
S7126	1-572-415-11	PUSH SWITCH (FF)			
S7129	1-572-415-11	PUSH SWITCH (PRISET)			
S7130	1-572-415-11	PUSH SWITCH (OK)			
S7137	1-572-415-11	PUSH SWITCH (ALL CLEAR)			
		PLUG			
TP711	1-569-073-11	PLUG 4P			
		CRYSTAL			
X7101	1-577-683-11	RESONATOR, CERAMIC			
X7102	1-577-676-11	CRYSTAL			
X7103	1-577-682-11	RESONATOR, CERAMIC			
**********					
		MISCELLANEOUS			
		**********			
	A-6050-671-A	COMPLETE PCB, 2N2P-V CYLINDER			
	1-466-392-11	MODULATOR, RF			
	1-808-710-11	PHOTO TRANSISTOR			
	3-735-687-01	HEAD, FTE			
	3-735-729-01	SW, LEAF			
**********					

ACCESSORIES AND PACKING MATERIALS
****

Part No.	Description	Remark
⚠1-575-325-11	CORD, POWER	
*3-746-716-01	CUSHION	
*3-746-717-01	CUSHION (RIGHT)	
*3-940-675-01	INDIVIDUAL CARTON	
3-752-559-01	MANUAL, INSTRUCTION (ENGLISH, DEUTSCH, RUSSIAN, FRENCH)	

****

When indicating parts by reference number, please include the board name.

Note: The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref.No	Part No.	Description	Remark

HARDWARE LIST
****

7-621-759-45 +PSW, 2.6X6

SCREW

7-621-775-10 SCREW +B 2.6X4
7-682-547-09 SCREW +B 3X6
7-682-947-01 SCREW +PSW 3X6
7-685-131-19 SCREW +BTP 2.6X4 TYPE2 N-S
7-685-534-19 SCREW +BTP 2.6X8 TYPE2 N-S

7-685-647-79 SCREW +BTP 3X10 TYPE2 N-S
7-685-647-79 SCREW +BVTP 3X10 TYPE2 N-S
7-685-647-79 SCREW +BVTP 3X10 TYPE2 SLIT
7-685-661-19 SCREW +BVTP 4X12 TYPE2 N-S
7-685-133-19 SCREW, TOTSU PTP 2.6X6 TYPE2

STOP RING

7-624-105-04 STOP RING 2.3, TYPE -E

****

When indicating parts by reference number, please include the board name.

Description

5% 1/4W A

CARBON RESISTOR 5% 1/4W

Value	Part. No.	Value	Part. No.	Value	Part. No.	Value	Part. No.	Value	Part. No.	Value	Part. No.
0.22Ω		11Ω	1-247-784-00	200Ω	1-247-814-11	3.6kΩ	1-247-844-11	62kΩ	1-247-874-11	1.2MΩ	
0.27Ω		12Ω	1-249-394-11	220Ω	1-249-409-11	3.9kΩ	1-249-424-11	68kΩ	1-249-439-11	1.5MΩ	
0.33Ω		13Ω	1-247-786-11	240Ω	1-247-816-11	4.3kΩ	1-247-846-11	75kΩ	1-247-876-11	1.8MΩ	
0.39Ω		15Ω	1-249-395-11	270Ω	1-249-410-11	4.7kΩ	1-249-425-11	82kΩ	1-249-440-11	2.0MΩ	
0.47Ω	1-249-377-11	16Ω	1-247-788-00	300Ω	1-247-818-11	5.1kΩ	1-247-848-11	91kΩ	1-247-878-00	2.2MΩ	1-259-880-11
0.56Ω	1-249-378-11	18Ω	1-249-396-11	330Ω	1-249-411-11	5.6kΩ	1-249-426-11	100kΩ	1-249-441-11	2.7MΩ	
0.68Ω	1-249-379-11	20Ω	1-247-790-11	360Ω	1-247-820-11	6.2kΩ	1-247-850-11	110kΩ	1-247-880-11	3.3MΩ	
0.82Ω	1-249-380-11	22Ω	1-249-397-11	390Ω	1-249-412-11	6.8kΩ	1-249-427-11	120kΩ	1-247-881-00	3.9MΩ	
1.0Ω	1-249-381-11	24Ω	1-247-792-11	430Ω	1-247-822-11	7.5kΩ	1-247-852-11	130kΩ	1-247-882-11	4.7MΩ	
1.2Ω	1-249-382-11	27Ω	1-249-398-11	470Ω	1-249-413-11	8.2kΩ	1-249-428-11	150kΩ	1-247-883-00	5.6MΩ	
1.5Ω	1-249-383-11	30Ω	1-247-794-11	510Ω	1-249-442-11	9.1kΩ	1-247-854-11	160kΩ	1-247-884-11	6.8MΩ	
1.6Ω		33Ω	1-249-399-11	560Ω	1-249-414-11	10kΩ	1-249-429-11	180kΩ	1-247-885-00	8.2MΩ	
1.8Ω	1-249-384-11	36Ω	1-247-796-11	620Ω	1-247-826-00	11kΩ	1-247-856-00	200kΩ	1-247-886-11	10MΩ	
2.2Ω	1-249-385-11	39Ω	1-249-400-11	680Ω	1-249-415-11	12kΩ	1-249-430-11	220kΩ	1-247-887-00	12MΩ	
2.4Ω	1-247-768-00	43Ω	1-247-798-11	750Ω	1-247-828-11	13kΩ	1-247-858-11	240kΩ	1-247-888-11	15MΩ	
2.7Ω	1-249-386-11	47Ω	1-249-401-11	820Ω	1-249-416-11	15kΩ	1-249-431-11	270kΩ	1-247-889-00	18MΩ	
3.0Ω	1-247-770-00	51Ω	1-247-800-11	910Ω	1-247-830-11	16kΩ	1-247-860-11	300kΩ	1-247-890-11	22MΩ	
3.3Ω	1-249-387-11	56Ω	1-249-402-11	1.0kΩ	1-249-417-11	18kΩ	1-249-432-11	330kΩ	1-247-891-00		
3.6Ω	1-247-772-00	62Ω	1-247-802-11	1.1kΩ	1-247-832-11	20kΩ	1-247-862-11	360kΩ	1-247-892-11		
3.9Ω	1-249-388-11	68Ω	1-249-403-11	1.2kΩ	1-249-418-11	22kΩ	1-249-433-11	390kΩ	1-247-893-11		
4.3Ω	1-247-774-00	75Ω	1-247-804-11	1.3kΩ	1-247-834-11	24kΩ	1-247-864-11	430kΩ	1-247-894-11		
4.7Ω	1-249-389-11	82Ω	1-249-404-00	1.5kΩ	1-249-419-11	27kΩ	1-249-434-11	470kΩ	1-247-895-00		
5.1Ω	1-247-776-00	91Ω	1-247-806-11	1.6kΩ	1-247-836-11	30kΩ	1-247-866-11	510kΩ	1-247-896-11		
5.6Ω	1-249-390-11	100Ω	1-249-405-11	1.8kΩ	1-249-420-11	33kΩ	1-249-435-11	560kΩ	1-247-897-11		
6.2Ω	1-247-778-00	110Ω	1-247-808-11	2.0kΩ	1-247-838-00	36kΩ	1-247-868-11	620kΩ	1-247-898-11		
6.8Ω	1-249-391-11	120Ω	1-249-406-11	2.2kΩ	1-249-421-11	39kΩ	1-249-436-11	680kΩ	1-247-899-11		
7.5Ω	1-247-780-00	130Ω	1-247-810-11	2.4kΩ	1-247-840-00	43kΩ	1-247-870-11	750kΩ	1-247-900-11		
8.2Ω	1-249-392-11	150Ω	1-249-407-11	2.7kΩ	1-249-422-11	47kΩ	1-249-437-11	820kΩ	1-247-901-11		
9.1Ω	1-247-782-00	160Ω	1-247-812-11	3.0kΩ	1-247-842-11	51kΩ	1-247-872-11	910kΩ	1-247-902-11		
10Ω	1-249-393-11	180Ω	1-249-408-11	3.3kΩ	1-249-423-11	56kΩ	1-249-438-11	1.0MΩ	1-247-903-00		

9-973-040-11

Sony Corporation
Home Video Group

English
90J06'2-1
Printed in Japan
©199'.10
Published by Customer Relations and Service Group